FLIGHT

NOVEMBER 1957
50 cents

TECHNOLOGY DEPT.

MAGAZINE

vol 46 #11

PIPER APACHE FOR 1958

Here's how to try a BELL in your business

The Bell helicopter is on many minds — every day the letters from business men, engineers, oilmen, come in. Already this year, all models of the Bell have enjoyed unprecedented sales. Why? Because the Bell user is its most zealous salesman. One utility president tells another how the Bell saved $3,500 a month in inspection costs. One manufacturer tells another how a Bell "hinterland local" helped his sales force tap $342,000 in new and out-of-the-way business. The Bell user can show sound reasons for his bold judgment.

Many Bell owners got acquainted with the helicopter through one of the excellent charter services situated throughout the nation. For this is certainly the economical way to learn quickly how the remarkable Bell *saves* money, *makes* money far beyond its capital investment. If you're not now ready to buy your Bell, charter one. We'll be happy to give you all the facts, plus names of the charter operators near you. Write us today. Department 3F, Bell Helicopter Corporation, Fort Worth, Texas.

BELL Helicopter CORPORATION

FORT WORTH, TEXAS

SUBSIDIARY OF BELL AIRCRAFT CORPORATION

Watch **"WHIRLYBIRDS"** *on TV . . consult your local paper for time and station.*

WE'VE HUNG OUT OUR SHINGLE ACROSS THE LAND

(The "Sign of Service" wherever planes land!)

In a host of airports across the length and breadth of this country, you'll see this famous "shingle" which denotes the headquarters of skilled men who are true professionals when it comes to servicing America's huge fleet of civil aircraft.

It's the Goodyear "Sign of Service"–service that has grown and kept pace with the phenomenal growth of private aviation.

This growth–and the acceptance it enjoys among flying consumers–is not due to "bigness" alone.

It has become the largest service network in the nation for reasons well known to the thousands of civil aircraft operators it serves each year.

Reasons like the way fair play is a must with airport dealers who fly this sign; like the fact that strategically located distribution points assure these men complete stocks of the things you need; like the foremost quality of the parts they carry; like the skills and workmanship of the mechanics who put this service into practice.

In short, it's the sign of a man with a reputation for dependability–backed by a complete line of parts that are tops in the aviation field. So, taxi on over and sample some *real* service!

Goodyear Aviation Products Distributors

AIR-PARTS INTERNATIONAL *Burbank, Cal.–New York, N. Y.*

PIEDMONT AVIATION, INC.
Winston-Salem, N. C.–Norfolk, Va.

VAN DUSEN AIRCRAFT SUPPLIES *Minneapolis, Minn.*
Boston, Mass.–Washington, D. C.–Teterboro, N. J.
Chicago, Ill.–Richmond, Va.

AIR ASSOCIATES, INC. *Atlanta, Ga.–Chicago, Ill.*
Dallas, Tex.–Miami, Fla.–Glendale, Cal.–Teterboro, N. J.

AVIATION SUPPLY CORPORATION OF FLORIDA
Tampa, Fla.–Orlando, Fla.

SKY SUPPLY *P.O. Box 873, Helena, Mont.*

VAN DUSEN AIRCRAFT SUPPLIES, *Southern Division*
Byrd Airport, Richmond 23, Va.

DENVER AIRPLANE SUPPLY
Stapleton Airfield, Denver, Colo.

THE DON HORN COMPANY
353 Madison Ave., Memphis, Tenn.

NATIONAL AVIATION SUPPLY CO.
906 Bowen St., Pittsburgh 12, Pa.

ATLANTIC AVIATION SERVICE, INC.
Box 1709, Wilmington, Delaware

STANDARD AIRCRAFT EQUIPMENT CO., INC.
P.O. Box 271, Mineola, Long Island, N. Y.

One in a series about users of Phillips 66 Aviation Products

Phillips 66 LOOKS AHEAD with FRONTIER

Partners in growth—Frontier Airlines and the bustling, dynamic West. Frontier links 40 cities, from Montana and North Dakota to New Mexico and Arizona, helping to shrink the vast distances of the region with fast, dependable air transportation. Connecting with all transcontinental air lines, Frontier is a major factor in the growth of business and pleasure travel throughout the West.

Frontier Sun Liner in flight over Denver, one of the forty Western cities served by Frontier Airlines.

● Today, Phillips 66 Aviation Gasoline gives dependable, efficient performance to Frontier and other leading air lines, as well as to the military air services.

In step with the future, Phillips is a leading producer of *super performance* Jet Fuels for the latest designs in turbo-props and jets. And Phillips research continues to lead the way for development of fuels for the aircraft of tomorrow.

AVIATION DIVISION • PHILLIPS PETROLEUM COMPANY • BARTLESVILLE, OKLAHOMA

AIR Report

Significant Trends and News

NEW 4-PLACE CESSNA MODEL 175 will fit between Models 172 and 182, will be powered by a 175-hp. engine and will be priced at about $11,000. Del Roskam, Cessna vice president and commercial aircraft manager, has hinted still another new Cessna model may be added soon. It is expected to be a 2-place Cessna.

WATCH FOR NEW 250-MPH. EXECUTIVE TRANSPORT to be announced by de Havilland Aircraft. It will be developed from the Dove, with a similar cabin, but will have a new wing and two 520-hp. Lycoming 8-cylinder GSO-720-A1A flat engines. Top speeds will be about 265 mph. at 10,000 ft. with a performance cruise of 240 mph. The 8-cylinder Lycoming is available with fuel injection.

CESSNA 4-ENGINE MODEL 620 PROJECT was suddenly deactivated last month because of several factors, including glut of low-cost surplus transports, rising costs which have placed the 620 in a relatively small potential market and Cessna's decision to put more emphasis on the light twin market. Personnel on 620 project have been absorbed in other Cessna activities. Fate of first 620 prototype, which was nearing end of its CAA flight tests, and second prototype, which was for static testing, is unknown. The 620 project began in 1954, the 10-12-place transport having 4 geared and supercharged 240-hp. Continental 6-cylinder engines and an 80-hp. AiResearch turbine auxiliary power unit de-rated to 40 hp. for its cabin pressurization, air-conditioning, heating and main electric generator. The 250-mph. transport had been priced at $375.000 with first deliveries expected next March from production facilities which were well along when deactivation was ordered.

GEORGE T. PEW IS BOTH CHAIRMAN AND PRESIDENT OF AERO DESIGN & ENGINEERING CO., Oklahoma City manufacturer of the Aero Commander, after announcement of last month's annual stockholders' election of officers failed to include mention of Rufe Amis, former president. Pew and Amis had started the company originally. Officers elected in addition to Pew are Budd Parks, vice president-secretary-treasurer; Ted R. Smith, vice president-engineering, research and development; R. J. (Bob) White, vice president-director of sales; Jack Laister, vice president-operations; H. S. (Tex) Newman, vice president-industrial relations, and Eugene Burke, controller.

LITTON INDUSTRIES WILL ACQUIRE AIRCRAFT RADIO CORPORATION of Boonton, N. J., pioneer in airborne radio and electronic equipment for over 29 years and manufacturer of the well-known ARC line. Negotiations were concluded and an agreement reached last month to submit to stockholders a plan for Litton's acquisition of controlling interest in ARC through an exchange

SIX NEW BEECH BONANZAS added recently by Central American Airways Flying Service, Inc., of Louisville, Kentucky, brings to 16 the number of Bonanzas operated at two flying schools by the firm. It uses the Bonanzas as instrument trainers for contract U. S. Army flight training.
—(Beech Photo.)

FLIGHT MAGAZINE

NOVEMBER, 1957 VOL. 46, No. 11

THIS MONTH'S COVER pictures two new 1958 Piper Apache twin-engine business transports on the ramp at the Broome County Airport in New York. The Apache is now available with either 150-hp. or 160-hp. Lycomings and gross weight has been boosted to 3,800 lbs. with an increase of about 250 lbs. in useful load. Details of all new models in the Piper line can be found on pages 26-31 in this issue.
—(Piper Photo.)

Air Report—SIGNIFICANT TRENDS AND NEWS 5

Just Among Ourselves—EDITORIALS: NEW FORMULA; A LETTER TO VIRGINIA 19

Opportunity Now for New Two-Seaters—BY BURRELL TIBBS—LONG-TIME INSTRUCTOR DISCUSSES NEED FOR TRICYCLE TRAINER 16

New Comanche Leads Piper Line for 1958—FIRST DETAILS ON NEW VERSIONS OF PIPER BUSINESS PLANES 26

Grumman's Propjet Gulfstream—DESIGN PERFORMANCE AND DATA FOR 370-MPH. BUSINESS TRANSPORT 32

Heavy Hauls by Vertol Flying Crane—NEW COMMERCIAL HELICOPTER TRANSPORT DEMONSTRATES OIL FIELD USEFULNESS 34

Business Aircraft Show—NATIONAL BUSINESS AIRCRAFT ASSOCIATION'S DENVER MEETING 38

Business Flying's Finest Private Airport—ADDISON AIRPORT OPENS IN DALLAS 46

Airmen's Calendar—COMING EVENTS 52

New Business in the Hangar—NATIONWIDE ROUNDUP OF INTERESTING DEVELOPMENTS IN BUSINESS FLYING 54

L. B. Smith's New Base—MIAMI MODIFICATION CENTER IN NEW HOME 55

Major Facility at Minneapolis—A VISIT TO MINNESOTA AIRMOTIVE 61

GEORGE E. HADDAWAY, Editor-Publisher; TOM ASHLEY, Managing Editor; FRED N. STONES, JR., Business Manager; LOUISE ROBERTSON, Circulation; E. H. PICKERING, Consultant; P. O. BOX 750 (2700 N. Haskell Ave.), Dallas, Texas — Telephone TAylor 3-6191.

FLIGHT MAGAZINE, November, 1957, Vol. 46 No. 11. Published Monthly. Publication office, P. O. Box 750 (2700 N. Haskell Ave.), Dallas, Texas. Price 50c single copy. Subscription rates: United States, one year $3.00; two years $5.00; three years, $6.00. Established February, 1934. Entered as second-class matter at the Post Office, Dallas, under the act of March 3, 1879.

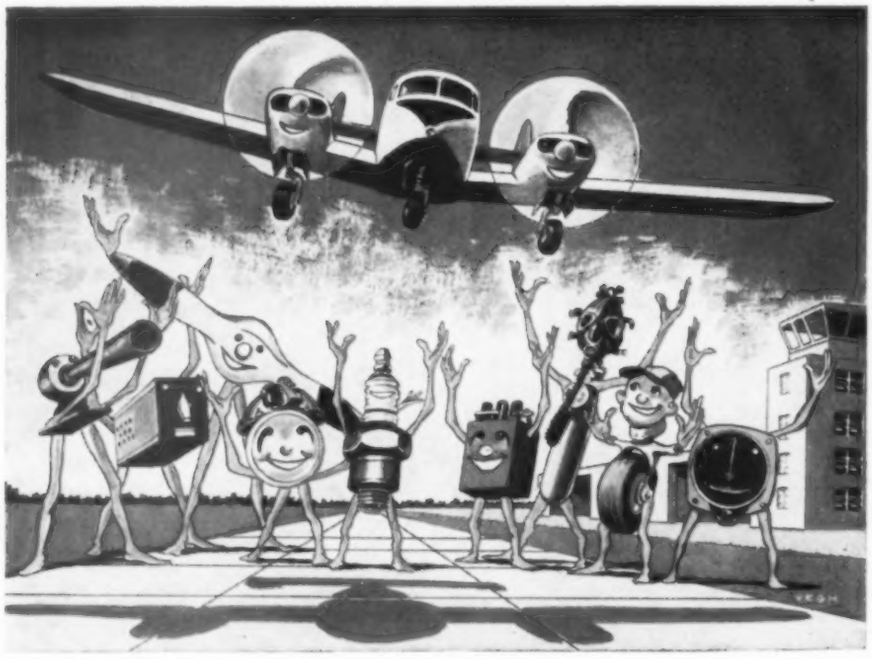
Copyright, 1957, by Air Review Publishing Corporation.

of stock. Under the plan, ARC will operate as a subsidiary of Litton with W. F. Cassedy, Jr., president, and other ARC officers retaining present positions and with no change in policies. Litton, headquartered in Los Angeles, recently acquired the Maryland Electronic Manufacturing Corp., developers and manufacturers of radar antennas, ground-based aircraft communications systems and other electronics complementary to the ARC line.

HELIO AIRCRAFT CORP. has named Edward T. Donahue sales manager. He has been with the firm two and a half years as demonstration pilot and a regional sales manager. Lynn L. Bollinger, president, said Donahue will divide his time between helio headquarters at Norwood, Mass., and its manufacturing division at Pittsburg, Kansas.

CONTINUED GAINS IN AIRCRAFT SALES are expected by Piper Aircraft, Sales Manager Jake Miller told the firm's annual distributor sales meeting last month. Two top quota busters were honored — Mario Lucci of Wallace Aircraft Co., Sarasota, Fla., and David Feltus of Arkansas Aviation Sales, Inc., Little Rock — and top 10 Top Hatters were announced as follows: (1) Baker Aircraft Sales, Long Beach, 174 planes sold in 1957 of which 100 were Tri-Pacers; (2) Tufts-Edgcumbe, Inc., Elgin, Ill., 79 sales; (3) Art Whitaker, Portland, Oregon, 69 sales; (4) Piedmont Aviation, Winston-Salem, 65 sales; (5) Safair Flying Service, Teterboro, 62 sales; (6) Louisiana Aircraft of Baton Rouge and Kenmar Airpark of Wichita tied for 6th with 60 sales each; (8) Safeway Airways, Anchorage, Alaska, 59 sales; (9) Des Moines Flying Service tied for ninth with Wiggins Airways of Norwood, Mass., with 58 sales. Special honors went to Jonas Aircraft & Arms Co., New York, export distributors for Latin America and Europe, with 385 sales.

HEADS OF CIVIL AVIATION in the U. S., Mexico and Canada are shown above in Dallas last month at dedication of new Love Field air terminal. Left to right are James T. Pyle of Washington, General Alberto Salinas Carranza of Mexico and Air Vice Marshal A. de Niverville of Ottawa. —(FLIGHT MAGAZINE Photo by Ed Miley.)



"WE KEEP 'EM FLYING"

Air Associates stocks the largest, most complete inventory of aircraft parts and accessories in the aviation industry. And Air Associates' tremendous buying power brings them to you at the most advantageous prices. You can always count on AA's *having* what you want, *delivering* what you want, whenever and wherever you want it. That's why Air Associates is truly your **Department Store of the Air.** To serve the nation in aviation, there are Air Associates divisions at

Atlanta, Ga. **Glendale, Calif.**
Chicago, Ill. **Miami, Fla.**
Dallas, Tex. **San Francisco, Calif.**
Teterboro, N. J.

AIR ASSOCIATES

RECORD PRIVATE TRIP IN A PIPER APACHE TWIN has been completed by Mr. and Mrs. Don Walcott of San Francisco with Frank Emmett of Atlanta. Their Apache was flown 22,000 miles in 140 hours across the North Atlantic to Europe, the Middle East, Africa, across the South Atlantic to South America and back home. They said the Apache was given no maintenance — not even a 100-hour check — and had only one oil change.

UNPRECEDENTED BUSINESS PLANE PERFORMANCE is claimed for Helio Aircraft's new Strato-Courier version of the Helioplane powered by a 340-hp. geared and supercharged Lycoming GSO-480 engine and Hartzell propeller. It will operate at over 30,000 ft. with full payload at 3,200-lb. gross weight under CAR Part 08 as an industrial airplane, chiefly for aerial photography. Sea level rate of climb is over 2,000 fpm. and it will reach 30,200 ft. in 50 mins. Useful load is 1,420 lbs., minimum control speed is 30 mph., maximum speed 194 mph., cruising speed is 182 mph. and maximum still-air range is

Have You Stopped to Think

What Automatic Flight Can Do for You?

IF you put an airplane to use regularly for cross-country business transportation, an automatic flight system can well be a very wise investment. Far from being an extra luxury frill, automatic flight, once you're accustomed to it, becomes as important as proper radio equipment for getting the most out of the type of transportation your airplane provides.

"Executive" of Your Own Plane

As stable as modern airplanes are and as easy as they are to fly, the continual attention you pay to holding a course, especially in rough air, occupies 95 per cent of your time. You are an *employee* of the airplane. With automatic flight, you become *executive* of your airplane.

The automatic pilot becomes *department head* in charge of keeping the airplane unerringly on course. You are free to do your best thinking all the time – free to make your communications unharried and unhurried – free to look around – free to keep track of your navigation.

No "Slave" to the DG

Modern flying by Omni-range has simplified cross-country navigation to the Nth degree, but it has put extra emphasis on holding course, the exact course required to keep the needle centered.

This has made the Directional Gyro the *master* of the cockpit, and you become its *slave*. An automatic flight system coupled to the Directional Gyro set to the exact course you want eliminates this burden. You feed in occasional new headings as needed and the airplane unerringly holds the course to the exact degree.

Ultimate in Transportation Ease

You don't appreciate the full value and usefulness of automatic flight until you make several extended cross-country trips. You find you're virtually a *guest* in your own airplane. You take off, then switch on the pilot, climb, turn on course, fly from one Omni to another, make your final approach – all by adjusting a few knobs on the automatic pilot. You take over for the landing. What this means in terms of reduced fatigue shows up in the completely refreshed mood with which you arrive at your destination.

And safety, of course, cannot be overlooked. For the VFR pilot inadvertently caught on instruments, an automatic pilot can literally be a life-saver.

Your IFR Co-Pilot

With the growing acceptance and the use of IFR operations by business pilots to increase the utility of their airplanes, the need for an automatic pilot is self-evident. It is almost a necessity for one-man IFR operations, freeing you to handle ATC communications, dope out the complicated course changes they throw at you, and fly holding patterns.

The heading lock provided on modern automatic pilots which are coupled with the Directional Gyro is particularly useful on ILS approaches. The localizer needle stays locked on center while you are free to concentrate on rate of descent.

Safer, easier, more restful – these words sum up automatic flight. We urge you to give serious thought to what an automatic flight system will do for you in your airplane.

We spent a good slice of our advertising budget for this ad explaining automatic flight, and haven't told you a thing about our Tactair autopilot. Maybe we should have asked other autopilot manufacturers to chip in, but we know that when you inevitably decide on automatic flight you'll see that the Tactair will do the job best for you. If you'd like to know why, just send for the Tactair T-3 brochure.

TACTAIR INCORPORATED AUTOPILOT DIVISION | **AIRCRAFT PRODUCTS CO.** BRIDGEPORT, PENNSYLVANIA

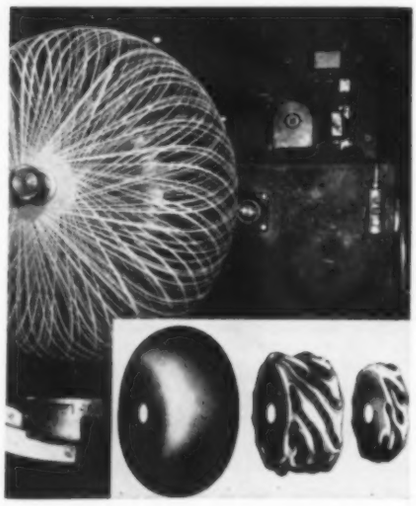
FOR 16 YEARS SPECIALISTS IN PRECISION AIRCRAFT PNEUMATIC AND HYDRAULIC CONTROLS

over 1,000 miles. The Strato-Courier can take off in little more than its own length and clear a 5-ft. obstacle in 100 yards, landing in 75 yards.

OVER 100 CANADIAN SEAPLANE RATINGS have been obtained by students of Cochand Flights, Inc., Quebec, since the school opened last spring, according to Dr. J. Robert Adams. Cochand Flights expects to double that number of skiplane conversions this winter at its Lac Masson base. It uses new Champion trainers, for which it is agent in Quebec.

OLD-TIMERS FROM HANCOCK COLLEGE, Santa Maria, California, who attended this pioneer aviation college between 1929-32 are asked to communicate with Al Horning, 3914 Sierks Way, Malibu, California, for a proposed reunion early in 1958.

INSTRUMENT APPROACHES ON CAA AIRWAYS increased 47% during fiscal 1957, numbering 1,049,000 as compared to 712,000 for the previous year. The figures are from "Federal Airways Air Traffic Activity," a 50-cent Department of Commerce booklet. It said the 10,800 CAA employes who operate the 93,000 miles of airways handled 27,987,000 fix postings during the year, a 22% increase. Several factors are cited for the increase in instrument approaches — airlines have agreed to conduct all their operations under instrument flight rules in the Washington-New York-Chicago triangle; business planes piled up a 69% increase for instrument approaches and the military had a 52% increase. CAA Air Route Traffic Control Centers reporting most instrument approaches were New York, 86,012; Atlanta, 72,98[illegible] and Los Angeles, 70,416. CAA airport traffic control towers reported 23,728,000 operations (an operation is a landing or a take-off), for a 16% increase. Gains were 21% for general aviation, 14% for the military and 11% for air carrier operations.



NEW AIRCRAFT TIRE developments by Fairchild Aircraft at Hagerstown, Maryland, including the use of continuous high-tensile nylon cord wound about the tire body like the spokes in a wheel for extra support at points where most stress is expected. Shown in large picture, it makes possible a larger tire weighing no more than conventional tires. Another Fairchild innovation (inset) is automatic tire vent system for deflation after take-off, folding and re-inflation as a "convertible" high-flotation gear.

TRANSVAL TRANSISTORIZED POWER SUPPLIES and other Transval items will be produced in Canada under license by Canadian Applied Research, Ltd., Toronto, an A. V. Roe member company.

AERONAUTICAL ELECTRONICS, INC., Raleigh, N. C., has announced a new Aerotron Model 500 two-way VHF transmitter-receiver for industrial radio service including Unicom. It consists of a 10-watt VHF transmitter and a crystal-controlled, dual-conversion VHF receiver with integral power supply capable of operation from 6-12 volts DC or 115 volts, 60-400 cycles AC, without modification. Virtually portable, it can be installed, removed or changed from vehicle to vehicle in minutes and is available in several models covering the frequency range of 108 to 180 mc. It is priced at $299.50, complete.

DALLAS AIRMOTIVE

points with pride . . .

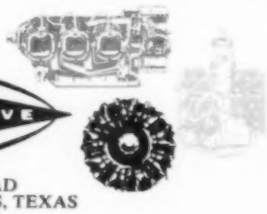
to its new facility

Dallas Airmotive, a pioneer in the field of aviation services, is proud to announce the formation of its Island Service Division.

At Galveston, in one of the most completely equipped installations of its kind, Corporate, Private and other Aircraft Operators will find:

• Modification of all types of aircraft • Custom luxury interiors • All types of airplane painting • Radio-Electronics-Navigation sales and installation • Transient service • Overhaul for conventional and helicopter aircraft • Storage • Accessory sales, installation and overhaul

In Dallas, Dallas Airmotive will continue to provide the finest engine overhaul services.



Island Service Division

GALVESTON, TEXAS

Now—all aviation services from the same Reliable company.

DALLAS AIRMOTIVE INC.

6114 FOREST PARK ROAD
FLEETWOOD 1-3771 • DALLAS, TEXAS

Washington Office:
Woodward Building
733 15th Street, N.W.
Washington, D. C.

New York Office:
1219 Marine Terminal Bldg.
La Guardia Station
Flushing 71, N. Y.

Vertol 44 solves transport problem for oil industry

The petroleum industry has a new tool, the Vertol 44 helicopter, to cut manhours, money and misery out of exploratory drilling at remote sites.

The Vertol 44 is a heavy-duty, universal vehicle that makes the sky a 100 mph highway, almost any clearing a landing field. Gone is the need to hack roads in jungle, swamp and mountains. You may need it for these money-saving missions:

Flying Truck: The Vertol 44 carries more than 2 tons of cargo in tropical areas...transports the entire 175,000 lbs. of a drill rig over a distance of 50 miles out and back, in only 56 flying hours. Its 600 cu. ft. cabin accommodates 50% more cargo than any other commercial helicopter, with no problem of load placement.

Flying Bus: Airlifts up to 19 passengers ... 2 typical field crews ...to jungle derricks or offshore drills ... flies exploration teams to otherwise inaccessible spots.

Flying Crane: Hops rivers, ridges and swampland with sling-loads of pipe, rig superstructure, large pump components or even mobile field offices.

Flying Tractor: Frees mired vehicles, hauls barges, drags sledges. It has even towed a 3,000-ton ship.

For more information on this multi-purpose vehicle for the oil industry, write to: Customer Relations Department

VERTOL Aircraft Corporation

MORTON, PENNSYLVANIA.

"It makes sense, Roger... the safest engine is a clean engine... and there's no cleaner engine than a Gulf-lubricated engine!"

Use new Gulfpride Aviation Oil Series D, the detergent oil, or Gulf Aircraft Engine Oil, the straight mineral oil. Either way, you'll be keeping your engine clean, and making it safer.

Gulf oils lubricate engines thoroughly and efficiently and also keep engines clean.

That means increased periods between engine overhauls, because of less wear and tear on engine parts.

Gulf Aircraft Engine Oil is the finest straight mineral oil you can choose—keeps engines as clean as any straight mineral oil can. But for the greatest possible cleanliness, buy Gulfpride Aviation Oil Series D, the detergent oil.

Gulfpride Aviation Oil—Series D. Detergent oil—for greatest possible cleanliness in radial, inline and horizontally opposed engines.

Gulf Aircraft Engine Oil—Straight mineral oil that minimizes sludge and oil inlet screen deposits, keeping your engine clean and safe.

GULF
AVIATION PRODUCTS

...the world's finest aviation products

To the boy who wants to fly

Here is the stuff that makes dreams come to life. There's a dash of science fiction...a bit of practical engineering...the clasp of a friendly hand...and a touch of faraway romance. There's adventure. And action. But above all, there is flight as the world below never knows it. Navy pilots are *given* nearly $100,000 worth of the world's finest executive training before they take command of the controls in high-performance jets like the Chance Vought F8U-1 *Crusader*, record-breaking Navy fighter. And when they make that final grade...the sky's no limit on any future they may choose.

Are *you* ready for it? Do you want the advantages that only Air Navy executive training can offer? Why not get the challenging facts and then decide. Clip and send the coupon to NAVCAD, Washington 25, D.C., right now.

CHANCE VOUGHT AIRCRAFT
INCORPORATED · DALLAS, TEXAS

BUILDERS OF MILITARY AIRCRAFT
40th ANNIVERSARY
1917 TO 1957

NAVCAD, WASHINGTON 25, D.C.
Now there are two Air Navy flight programs.

(*please check the one you want.*)

☐ NAVCAD Program. If you are 18-25, unmarried, with at least two years of college, you can qualify for the regular program.

☐ AVIATION OFFICER CANDIDATE. If you are 18-26, a college graduate, married or unmarried, you are eligible for early commission, increased pay and other benefits. *CV-18*

NAME_____ AGE_____

ADDRESS_____

CITY_____ ZONE_____

STATE_____

A brand new concept in

modern day hangars...

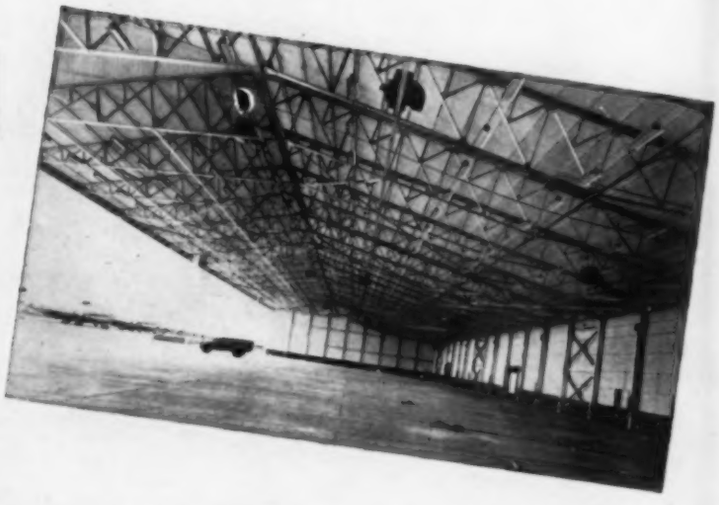
ERWIN-NEWMAN SUSPENDED CANTILEVER HANGARS

Most revolutionary development in the last fifty years

Cantilever type construction means that no columns of any nature interrupt the clear span space. EVERY square foot of hangar space is a square foot of usable space. The support member which connects the top ridge of the cantilever to the top of the inner column is designed to act either in tension or compression and will withstand the exact load forces of any locality.

ANY HEIGHT • ANY LENGTH • ANY DEPTH

Each hangar is specifically designed for the snow and roof loads of the area in which it is erected. The space at the rear is conveniently used for workshops, parts and offices.



Night view of TEMCO AIRCRAFT CORP. hangar at Greenville, Texas. The clear span area measures 120 feet deep by 576 feet long by 30 feet high. Vertical clearance is 45 feet inside the tail housings.

TYPICAL QUOTES FROM SATISFIED USERS INCLUDE:

Mr. E. F. Buehring, Plant Manager, TEMCO AIRCRAFT CORP., says, "The cantilever type hangar constructed by your company has proved to be highly satisfactory for our aircraft overhaul and modification program."

Mr. C. F. Zimmerman, Supt. Aviation Operations, CONTINENTAL OIL CO., remarked, "It is our opinion that this hangar constructed by your firm has measured up to our expectations and fulfills all of our requirements."

Write us for free booklet or any other information you desire

THE ERWIN-NEWMAN CO.

Designers and Constructors

P. O. BOX 1308 • PHONE JAckson 4-8186 • HOUSTON, TEXAS

DOUBLE DIAGNOSIS TO PREVENT "HEART DISEASE"

...BY THE B&H JETCAL® ANALYZER

Two of the most important factors that affect jet engine life, efficiency, and safe operation are *Exhaust Gas Temperature (EGT)* and *Engine Speed (RPM)*. Excess heat will reduce "bucket" life as much as 50% and low EGT materially reduces efficiency and thrust. Any of such conditions will make operation of the aircraft both costly and dangerous. The *JETCAL Analyzer pre*determines accuracy of the EGT and (interrelatedly) Tachometer systems and isolates errors if they exist.

The *JETCAL* ANALYZES JET ENGINES 10 WAYS:

1) The JETCAL Analyzer *functionally* tests EGT thermocouple circuit of a jet aircraft or pilotless aircraft missile for error *without running the engine or disconnecting any wiring*. GUARANTEED ACCURACY is ±4°C. at engine test temperature.

2) Checks individual thermocouples "on the bench" before placement in parallel harness.

3) Checks thermocouples within the harness for continuity.

4) Checks thermocouples *and* paralleling harness for accuracy.

5) Checks resistance of the Exhaust Gas Temperature system.

6) Checks insulation of the EGT circuit for shorts to ground and for shorts between leads.

7) Checks EGT Indicators (in or out of the aircraft).

8) Checks EGT system with engine removed from aircraft (in production line or overhaul shop).

9) Reads jet engine speed while the engine is running with a guaranteed accuracy of ±0.1% in the range of 0-110% RPM. Additionally, the TAKCAL circuit can be used to trouble shoot and isolate errors in the aircraft tachometer system.

10) JETCAL Analyzer enables engine adjustment to proper relationship between engine temperature and engine RPM for maximum thrust and efficiency during engine run (Tabbing or Micing).

ALSO *functionally* checks aircraft Over-Heat Detectors and Wing Anti-Ice Systems (thermal switch and continuous wire) by using TEMPCAL Probes.. Rapid heat rise . . . 3 minutes to 800°F! Fast cycling time of thermal switches . . . 4 to 5 complete cycles per minute for bench checking in production.

Tests EGT System Accuracy to ±4°C at Test Temperature

(functionally, without running the engine)

Tests RPM Accuracy to 10 RPM in 10,000 RPM (±0.1%)

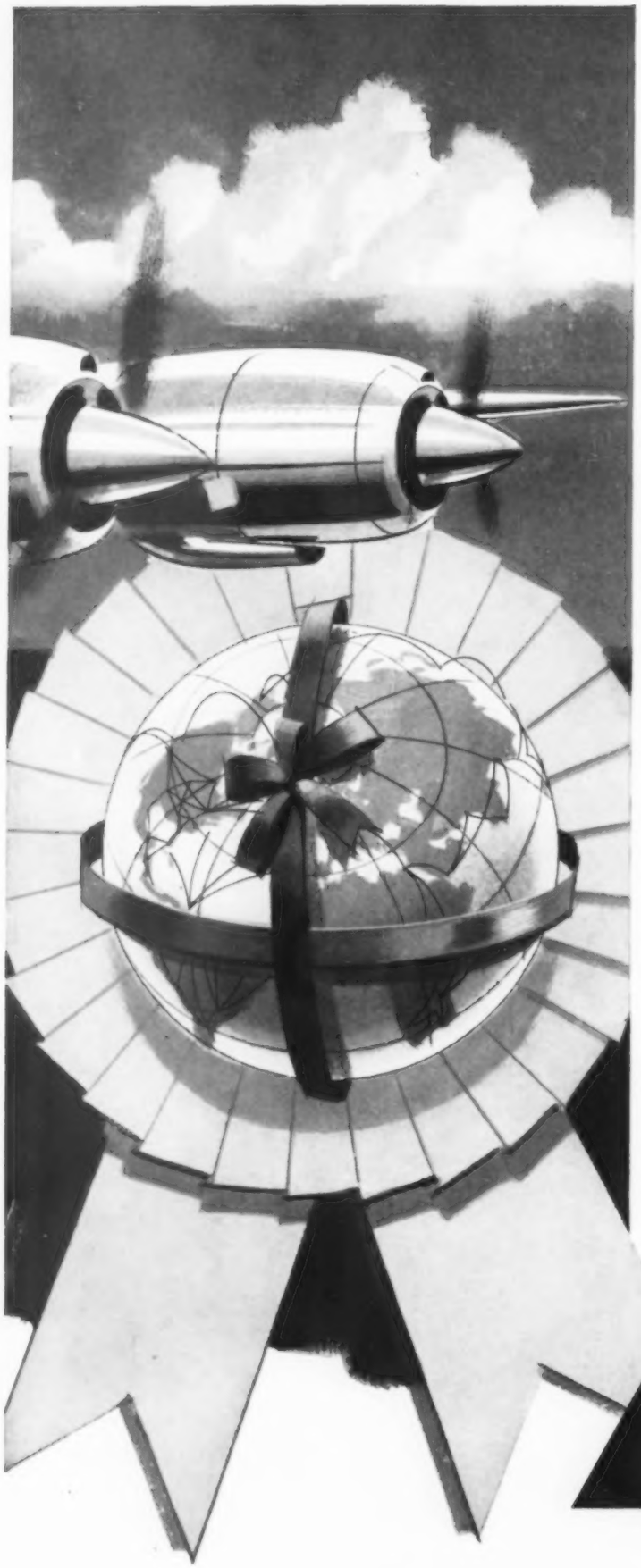
The JETCAL is in worldwide use . . . by the U. S. Navy and Air Force as well as by major aircraft and engine manufacturers. Write, wire or phone for complete information.

B & H INSTRUMENT CO., INC.

3479 West Vickery Blvd. • Fort Worth 7, Texas

Sales-Engineering Offices:

VALLEY STREAM, L.I., N. Y.: 108 So. Franklin, LO 1-9220 • DAYTON, O.: 209 Commercial Bldg., MI 4563 • COMPTON, CAL.: 105 N. Bradfield St., NE 6-8970



CURTISS-WRIGHT TURBO COMPOUND

The BLUE-RIBBON ENGINE that "packages" Global Travel

Across nations, over oceans, on the Polar and Great Circle routes between continents, the Curtiss-Wright Turbo Compound® engine is today "packaging" global travel in its most convenient form – *non-stop* direct to your destination.

Behind this powerful engine, 41 of the world's leading airlines have opened up new "blue-ribbon" routes around the globe, non-stopping distances of more than 5,000 miles at speeds beyond 350 miles per hour, in luxurious Douglas DC-7s and Lockheed Super Constellations. Only the Curtiss-Wright Turbo Compound of all airline engines today is capable of this kind of long-range performance.

When projected airline schedules are in full effect, more than 100 million global seat miles daily will be at your service on the fast, luxurious Turbo Compound-powered transports.

WRIGHT AERONAUTICAL DIVISION
CURTISS-WRIGHT
CORPORATION • WOOD-RIDGE, N. J.

World's Finest Aircraft Engines

Divisions and Wholly Owned Subsidiaries of Curtiss-Wright Corporation:

WRIGHT AERONAUTICAL DIVISION, *Wood-Ridge, N. J.* • PROPELLER DIVISION, *Caldwell, N. J.* • PLASTICS DIVISION, *Quehanna, Pa.* • ELECTRONICS DIVISION, *Carlstadt, N. J.* METALS PROCESSING DIVISION, *Buffalo, N. Y.* • SPECIALTIES DIVISION, *Wood-Ridge, N. J.* • UTICA-BEND CORPORATION, *Utica, Mich.* • EXPORT DIVISION, *New York, N. Y.* CALDWELL WRIGHT DIVISION, *Caldwell, N. J.* • AEROPHYSICS DEVELOPMENT CORPORATION, *Santa Barbara, Calif.* • RESEARCH DIVISION, *Clifton, N. J.* & *Quehanna, Pa.* INDUSTRIAL AND SCIENTIFIC PRODUCTS DIVISION, *Caldwell, N. J.* • CURTISS-WRIGHT EUROPA, *N. V., Amsterdam, The Netherlands* • TURBOMOTOR DIVISION, *Princeton, N. J.* MARQUETTE METAL PRODUCTS DIVISION, *Cleveland, Ohio* • CURTISS-WRIGHT OF CANADA LTD., *Montreal, Canada* • PROPULSION RESEARCH CORPORATION, *Santa Monica, Calif.*

Operation Call and Haul

During Exercise "Call and Haul" at Fort Riley, Kansas, 15 U.S. Army Otters of the 2nd Company moved 305 fully equipped combat troops of the 16th Infantry a distance of 35 miles in 80 minutes.

Subsequently, 10 Otters shuttled 20 tons of ammunition and supplies into an improvised "battle field" landing strip in a 45 minute period.

The Otter carries a crew of two—over a ton of payload—lands in less than 600 feet.

The Otter—Designed and Built by

THE DE HAVILLAND AIRCRAFT OF CANADA LIMITED

DOWNSVIEW, ONTARIO

Put These FACTORY Facilities to Work for You . . . When the Next Overhaul Time Rolls 'Round

The Men and Machines That BUILT Your Engine Originally Are Best Qualified to Restore It to Like-New Condition

Factory re-manufacture as conducted at Continental Motors differs in vital respects from even the most thorough overhaul obtainable in the field. That is because neither the experience of Continental production personnel, nor the precision machinery implementing that experience, can be matched outside the Continental plant . . . Every re-manufactured Continental engine is delivered fully run-in, ready for use in normal flight without further run-in or slow time. Rigid quality control applies throughout re-manufacture exactly as it does to original production . . . WITH YOUR FACTORY RE-MANUFACTURED CONTINENTAL, YOU RECEIVE NEW LOG BOOK, STARTING AT ZERO HOURS IN ACCORDANCE WITH CIVIL AIR REGULATION 43-24, COVERING SPECIFICATIONS FOR REBUILT ENGINES.

ALL CONTINENTAL AIRCRAFT ENGINE MODELS ARE AVAILABLE AS FACTORY RE-MANUFACTURED ENGINES

When buying a utility plane, choose one with all the plus values that have made Continental pilots' first choice.

Continental Motors Corporation

AIRCRAFT ENGINE DIVISION
MUSKEGON • MICHIGAN

Opportunity Now for New Two-Seaters

By BURRELL TIBBS

EDITOR'S NOTE: The author has been instructing student pilots since 1915 and is still instructing them. When asked how many students he has soloed, he declined to number them, saying there would be so many "nobody would believe it."

NOW is the time for the aircraft industry to come out with something new in reasonably-priced two-place airplanes.

Everybody will agree that it's high time something progressive be undertaken in trainers, where obsolescence has already handicapped instructors and students alike. The most obsolete feature is the tail-wheel gear. This has become so obvious that even the prospective student arrives at the airport with preconceived notions about tricycle gear advantages which the most conscientious instructor can not overcome.

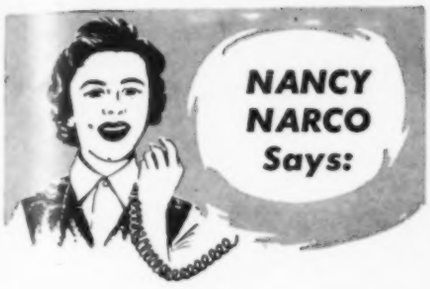
Business flying is wonderful, all right, but it has gone right off and left instructional flying wallowing around on its own inability to do anything about designing something new. People say little airplanes are unprofitable. All we know is that they may be, but they sure built up a helluva big industry. We think they can build this industry into an even bigger one, too. Students are basic. Without them, business flying can die on the vine. Would it be asking too much to devote some of today's profits to bringing out something new in little trainers?

My opinion is that any new trainer should emphasize simplicity and economy. For this reason it should have about the same characteristics as the old J-3 Cub. This means, for example, a 65-hp. engine. A lot of these little motors were built and a great many are available at reasonable cost. But the same basic airplane should be certified for a range of horsepower — say from 65 to 100 hp.

For economy also I would build it with steel tube and fabric. Wings can be composite or complete metal. This is as much for ease of maintenance and repairs as for any other reason.

I like tandem seating, and I think the student should occupy the front seat. This front seat should be ad-

(Continued on page 66)



Surprising number of pilots, especially students and new plane owners, are understandably confused about frequencies and basic communications — particularly now that even our little Superhomer has a 12-channel transmitter. Here's a quick rundown:

1. *To Talk to Towers.* Transmit on 122.5, the frequency universally used except in a few busy terminal areas where some airports guard 122.6 or 122.7.

Or you can talk to the tower Simplex-fashion. That is on their same frequency. That frequency, the one to which you should be tuned to receive the tower, is shown on the chart in the box giving information about the airport in question. The VHF frequency is the first blue figure which appears after data on elevation and runway length.

2. *On the Ground.* Ground control at busy airports uses either 121.7 or 121.9,—the tower will tell you which. If you have these frequencies talk and listen to ground control except near the active runway.

3. *En Route.* To call a CAA station (not a tower) going cross-country, call them on 122.1. They will talk to you either on their Omni or LF range frequency or on 122.2 if you so request. Some Omnis are operated remotely from another station, so don't be surprised if you call "Stroudsburg Radio" and have "Allentown Radio" reply. Some Omni stations have no voice, and are so indicated on the chart.

CAA stations can also communicate on Simplex on 126.7 if you request it.

4. *Emergency.* All towers, CAA stations, military airports, radars, etc. guard and transmit on the emergency frequency of 121.5.

5. *Unicom.* Talk to and listen to airports equipped with a Unicom ground station on 122.8 or the new 123.0 for Unicom installations at airports with towers.

6. *Frequencies You Need.* In most cases and places you could still get by with 122.1 and 122.5. Nine frequencies will get you anywhere: 121.5 emergency; 121.7, 121.9 ground control; 122.1 en route; 122.5, 122.6, 122.7 towers; 122.8, 123.0 Unicom.

You might want to clip this as a helpful reminder.

Happy Megacycles

Nancy

NARCO • Fort Washington, Pa.

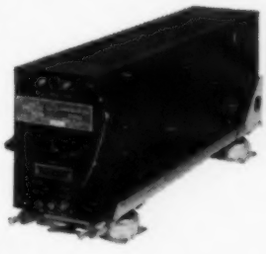
P. S. If you haven't seen the new Narco "How to Fly Omni" booklet, just write me for your FREE copy.

narco Sapphire 1016

90 or 360 CHANNEL TRANSMITTER
90 or 560 CHANNEL RECEIVER

When you see an aircraft with the Narco Sapphire 1016 antenna you know it's equipped with the ultimate in fine communications. Designed for reliable VHF communications on every frequency provided for present and future civil aircraft communications, the 1016 has a VHF transmitter capacity of 90 or 360 channels and crystal-controlled receiver of 560 channel capacity. Precise 50 kc separation is provided through the entire range from 108 to 135.95 mc.

The Sapphire 1016 is CAA-certificated for airline use and matches the quality, performance and dependability of the finest airline-type equipment. Yet its price compares with limited channel equipment normally used in executive aircraft.



1016 unit occupies ½ ATR rack; total weight 24¾ lbs.

NOW! PRECISION VOR/ILS CONVERTER FOR THE 1016

Now you can add VOR/ILS localizer function to the Sapphire 1016 with the Narco VOA-3 converter-indicator. Adaptable also to the Narco Simplexer. Fits any standard instrument cut-out; total weight, including remotely-installed converter unit, 4 pounds. Extreme accuracy and reliability.

See your Narco dealer or write for brochure

narco

NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

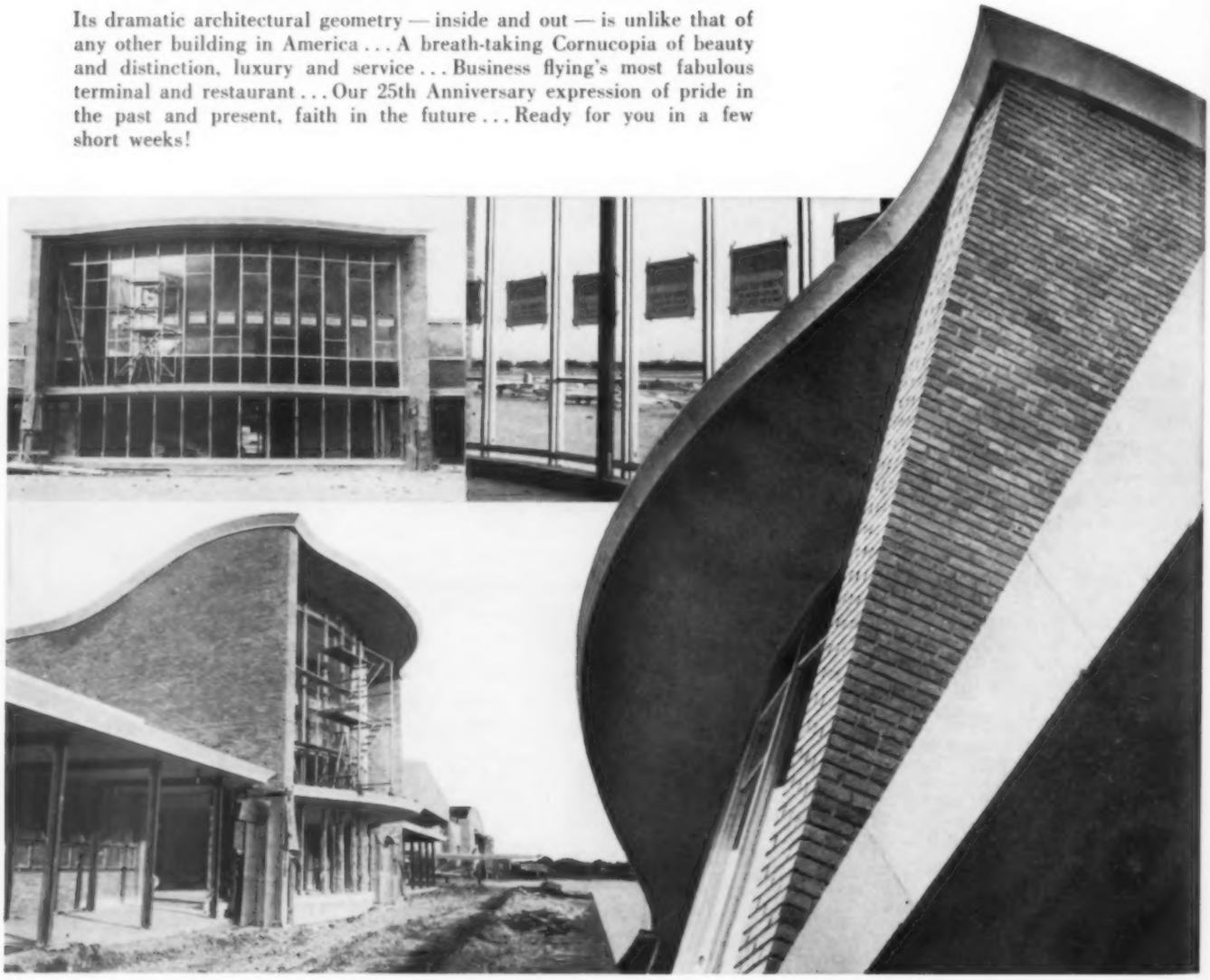
SAC Silver Jubilee Newsreel

BY JACK PATTON

THE DREAM COMES TRUE
CHEZ PLUSHY-PLUSHY!
FLYERS ARE DAZZLED BY SAC'S NEARLY-FINISHED BIZ FLYING TERMINAL.
WHAT HATH WE WROUGHT !?!
SAC
IT'S SO SPECTACULAR, EVEN WE FIND IT HARD TO BELIEVE.
ZEE FOOD WEEL BE MAGNEEFEEK!
THE CHEF IS IN A TISSY TO GET GOIN' IN AVIATION'S MOST DRAMATIC RESTAURANT
A HOME AWAY FROM HOME!
THAT FORGOTTEN MAN...THE AIRPLANE OWNER...WILL HAVE A PRIVATE LOUNGE

The Wonderful Shape of Things ~~to~~ *that have* Come!

Its dramatic architectural geometry — inside and out — is unlike that of any other building in America . . . A breath-taking Cornucopia of beauty and distinction, luxury and service . . . Business flying's most fabulous terminal and restaurant . . . Our 25th Anniversary expression of pride in the past and present, faith in the future . . . Ready for you in a few short weeks!



1932 —A QUARTER CENTURY OF LEADERSHIP— 1957

Southwest Airmotive Co.

LOVE FIELD DALLAS

DIVISIONS: KANSAS CITY, KANSAS DENVER, COLORADO

Just among ourselves

New Formula

IN a speech prepared for the National Business Aircraft Association annual convention in Denver, Colorado, last month Mr. Elwood R. Quesada, special assistant to the President and chairman of the Airways Modernization Board, revealed that he had called on the General Aviation Facilities Planning Group to suggest the name of a man who could, from time to time, serve as a spokesman for all general aviation before the Board. In addition he is asking GAFPG to submit the names of active general aviation people to fill certain staff positions on his Board.

By now practically everybody knows the AMB is attacking the modernization of the nation's aviation facilities on a system-wide basis and that it is to prepare a reorganization plan of the Federal Government as outlined in the Curtis report. Quesada must have legislation ready for Congress by January, 1959, outlining the scope and functions of a new Federal Aviation Agency. In substance, this means that the Civil Aeronautics Act of 1938 will be completely re-written and Congress will be asked to establish a new agency, which no doubt will be an independent one.

All this means that 1958 will probably be one of the most significant years in all civil aviation history. The role general aviation plays in writing this history, in fact in writing its own ticket, will determine the course of civil aviation progress for many years to come.

The big danger within the ranks of general aviation is the age-old disease of passing the buck — the majority of the people and companies in general aviation simply prefer to stay aloof from the industry's problems and leave all the work and expense up to a hardy few. If these same people shirk the responsibilities they have shirked in the past during the next critical year and a half, they deserve to be legislated right out of the air and off the public owned airports. They will deserve to be taxed for the aviation facilities and forced to operate under crippling regulations. It is all too clear at this time that the harvest they reap will be in exact proportion to the support they give their trade associations, their pilot organizations and the few industry groups who have accepted the responsibilities thus far.

The work outlined for Mr. Quesada and his all-powerful Airways Modernization Board has just begun. There is time for every individual and for every company to get behind the industry groups now operating within the framework of the General Aviation Facilities Planning Group (names on request!) as a dues paying member and as an active participant in writing the rules and regulations and helping to find the formula under which we'll operate for several decades to come. If general aviation interests fail in the assignments given to them it will be due to the apathy and the nonsupport of the majority who make up the ranks of general aviation in the United States. The monkey is squarely on their backs.

A Letter To Virginia

DEAR Virginia: Yes, Virginia, we believe there is a Sputnik.

Like you, we haven't seen it. But all the experts say it is there, and we must take their word for it even though the Russians are notorious prevaricators.

The tragic thing for us, Virginia, is the fact that we have a few prevaricators in this country also.

First, the Eisenhower administration discounted Russian claims of having successful intercontinental ballistic missile (ICBM) firings. The explanation was that success of the firings was doubtful but that even if true, there was little significance until Russia had ICBM's in production quantities and it would take several years for this to be achieved.

Meanwhile, Virginia, aircraft industry contracts were slashed and stretched out for the convenience of an arbitrary ceiling on defense spending, rather than for any realistic appraisals of Russian threats and strength.

Then came the Russian announcement of Sputnik, the first artificial satellite. It was called a neat scientific trick and discounted, even doubted, until it was confirmed by tracking. Then it was called "harmless." We were told there was no competition to launch the first satellite. President Eisenhower himself stated that if there had been a race we would have beat the Russians and furthermore, the U. S. satellite, when launched, would be a superior one.

This reaction is about the sorriest display of know-nothing-do-nothing administrative policy in recent history. It insults the intelligence of high school students and even space-cognizant children.

What worries us, Virginia, is the official attempt to ignore the enormity of the Russian accomplishment. The very mechanics of the Russian build-up will not permit it to be ignored, for any nation's effort scaled to successful ICBM firings and satellite orbiting is Herculean enough to produce many more accomplishments from which we can not hide.

Intercontinental ballistic missiles, especially those with which satellites can be orbited with accuracy, possess significance to stagger the imagination. No nation would burden itself with the tremendous costs involved merely to produce a propaganda weapon. This formidable achievement is for nothing less than world domination. The terms "intercontinental" and "space" have identical meanings in the missile language — supremacy of earth.

We may be led to believe the Russians are crude in many ways. But no sane person can look at a man-made object hurtling multiple millions of miles overhead and consider that ob-

(Continued on page 68)

CONVAIR JET 880

Fastest... Finest... for the new jet age!

Fastest at 615 miles an hour, the Convair Jet 880 also is designed in every detail to lead the way in luxury. With exciting new interiors by world-famed designers and Convair's traditionally excellent engineering, the 880 assures you the *fastest...finest* air travel *in the new jet age.*

CONVAIR

A DIVISION OF GENERAL DYNAMICS CORPORATION

Among airlines to first offer Convair 880 Jet-Liner service will be

TWA • DELTA

TRANSCONTINENTAL, S.A. *(Argentina)*

Another ARC Flight Proved Product

The Type 210 360 Channel VHF Transceiver. Now available—a high powered VHF Transceiver that permits two-way communication on ALL frequencies likely to be used for many years . . . choice of *any* required frequency for any part of the country, whether you fly under VFR or IFR conditions. Here is extra safety insurance for you and others on today's more crowded airways.

THE SYSTEM:

- **Frequency range: 118.00 to 135.95 mc**
- **360 channels, spaced 50 kc**
- **Weight of entire system: 22 pounds, compact size**
- **Operation: single channel simplex or double channel simplex by pilot selection**

TRANSMITTER:

- **Power output: 15 watts, high level amplitude modulation**
- **SCS/DCS: Transmitter can operate 6 mc higher than receiver in DCS position and on same frequency in SCS control position**

RECEIVER:

- **Sensitivity 2 microvolts at 10 db $\frac{S+N}{N}$**
- **AVC: 3 db, 10 to 10,000 microvolts**
- **Image rejection: over 70 db; all other spurious rejections over 80 db**
- **Automatic noise limiter**

Backed by 29 years of leadership in airborne electronic equipment exclusively, and over 18 months of laboratory and flight testing, the Type 210 assures you of ARC's well known exacting standards of engineering and quality manufacture.

Ask your dealer or write us for descriptive brochure.

Dependable Airborne Electronic Equipment Since 1928

Aircraft Radio Corporation BOONTON, NEW JERSEY

Omni/Loc Receivers • Course Directors
Miniaturized Automatic Direction Finders • LF Receivers and Loop Direction Finders • UHF and VHF
Receivers and Transmitters • 10-Channel Isolation Amplifiers • High Powered Cabin Audio Amplifiers • Interphone Amplifiers
Omnirange Signal Generators and Standard Course Checkers • 900-2100 Mc Signal Generators

New York to Paris in 15 minutes

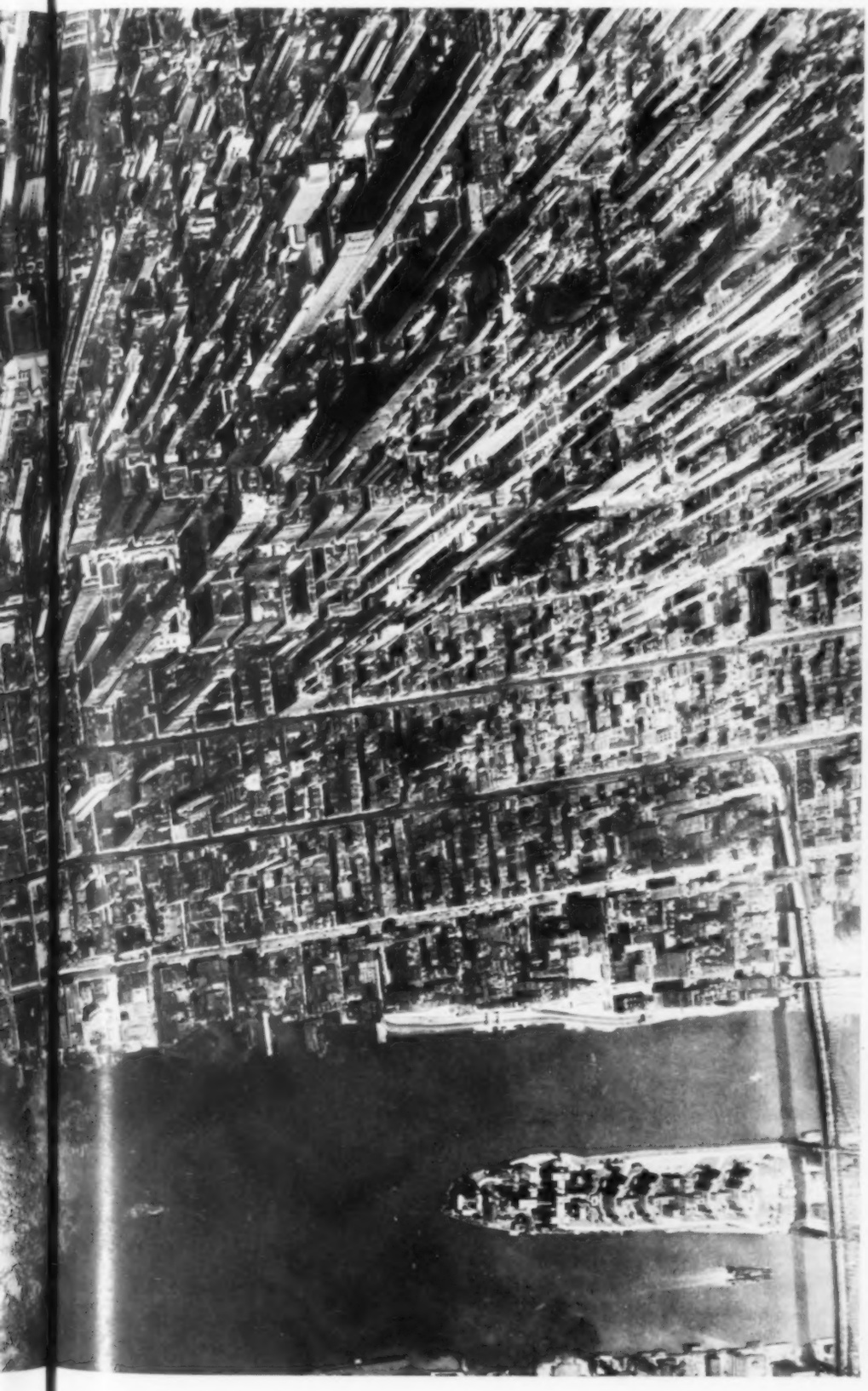
Before the present century ends, authorities have said you will be able to board a rocket and cross the Atlantic in minutes. Or circle the Earth in an hour . . .

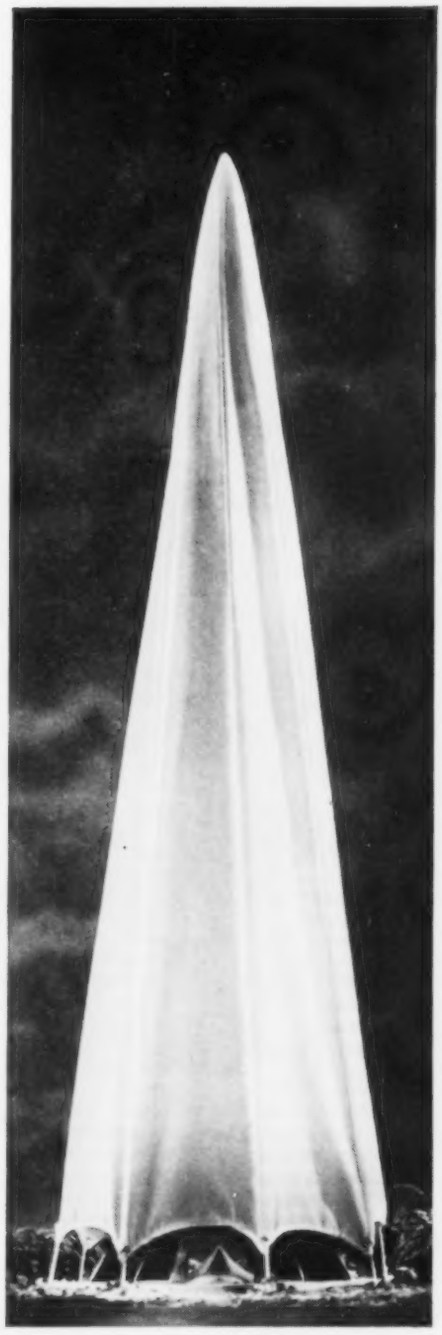
This is being brought about because of *practical* research on problems that need answering now. At Douglas, for instance, work to cushion sensitive

instruments against the tons of gravitational pull they meet in a rocket take-off tells much that will help protect passengers in a rocket ship. Improved aerodynamic design for supersonic fighters suggests more efficient airframes for rockets. The control system which will permit directing the Douglas *Thor* missile to a target 1500 miles away leads to controls for tomorrow's rocket ships.

Today, Douglas engineers work in fields ranging from atomic power to electronics, thermodynamics to acoustics. You see the results in skies around the world, in aircraft, rockets and missiles for all of our armed services.

COAST AND GEODETIC SURVEY





Thor, new intermediate range ballistic missile developed for the Air Force by the Douglas Aircraft Company is still a hush-hush project. Thor is designed to carry a thermonuclear warhead at meteoric speeds . . . when operational will supplement the manned bomber force of the Strategic Air Command. Douglas is now building three basic types of rocket and missile: air-to-air, ground-to-air, and ground-to-ground.

Depend on
DOUGLAS
first in Aviation

BENDIX* IGNITION SYSTEMS—FOR THE BEST IN JETS

Scintilla Division of Bendix Aviation Corporation designs and manufactures complete ignition systems for the most modern and powerful turbojet and turboprop engines. An ignition system, incorporating the benefits of years of ignition design experience, is provided for the Pratt & Whitney Aircraft J-75 turbojet—described as "the most powerful production turbojet engine known to exist in the free world".

The J-75 is in the 15,000 pound thrust class. Power is augmented by use of an afterburner. This engine will provide the "muscle" for a number of advanced military and commercial aircraft. For installation and maintenance flexibility, Bendix provides one ignition system applicable to both the J-75, shown here, and the well-known Pratt & Whitney Aircraft J-57 engine. Serviceability, reliability, and extended overhaul life are inherent features of Bendix designed jet engine ignition systems.

*TRADE-MARK

Scintilla Division
SIDNEY, NEW YORK

Bendix
AVIATION CORPORATION

Approach Horizon

a continuous picture of flight attitude and navigational situation on two easy to read instruments

Course Indicator

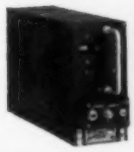
Collins Integrated Flight System...FD-104

a part of Collins new lightweight communication-navigation equipment line for business aircraft.

This system does the computing for the pilot. Combines available data in an unambiguous manner and presents it pictorially on two easy-to-read instruments. Shows precise attitude, navigation, and steering information in picture form for approaches under instrument landing conditions and for enroute navigation. Puts the pilot on selected magnetic heading or desired VOR course smoothly, in minimum time. Assures that he has taken and is continuing to take correct action. Panel instruments for the system are 3" diameter. Steering computor is in short ½ ATR case. System weight: 30.6 lbs. Power requirement: 100 VA start, 50 VA run (115 400 cps 1 ϕ plus 28V DC).

Collins CREATIVE LEADER IN AVIATION ELECTRONICS COLLINS

See your Collins authorized dealer or distributor. Many new ones are now being appointed.



51X-2 VHF Communication Receiver

880 50 kc crystal-controlled channels from 108.0 to 151.95 mc. Short ¾ ATR. Weight 10 lbs. Self-contained power supply. Provides complete VOR and localizer operation when used with 344B-1 VOR instrumentation unit.

51Z-2 Marker Beacon Receiver

Weighs only 4.5 lbs. Provides aural and visual indication of passage over a 75 mc marker beacon. Modularized. Only 5 tubes. Available in single or three lamp configuration. Short ¼ ATR.

DF-201 ADF System

Provides automatic or manual DF, AM, CW, or range reception. Complete system including receiver, loop antenna control unit and shockmount weighs only 29.4 lbs. Continuous electrical tuning from 90 to 1800 kc utilizing digital indicator.

17L-7 VHF Communication Transmitter

Companion to the 51X-2, 680 50 kc crystal-controlled channels from 118.0 to 151.95 mc. Maximum frequency change time, 4 seconds. Weight: 14 lbs. including integral power supply. Short ¾ ATR.

51V-3 Glideslope Receiver

20 crystal-controlled channels incorporating motor driven crystal switches for increased reliability. Weight only 6.4 lbs. Short ¼ ATR. With 51R navigation receiver fulfills all ILS glideslope and localizer requirements.

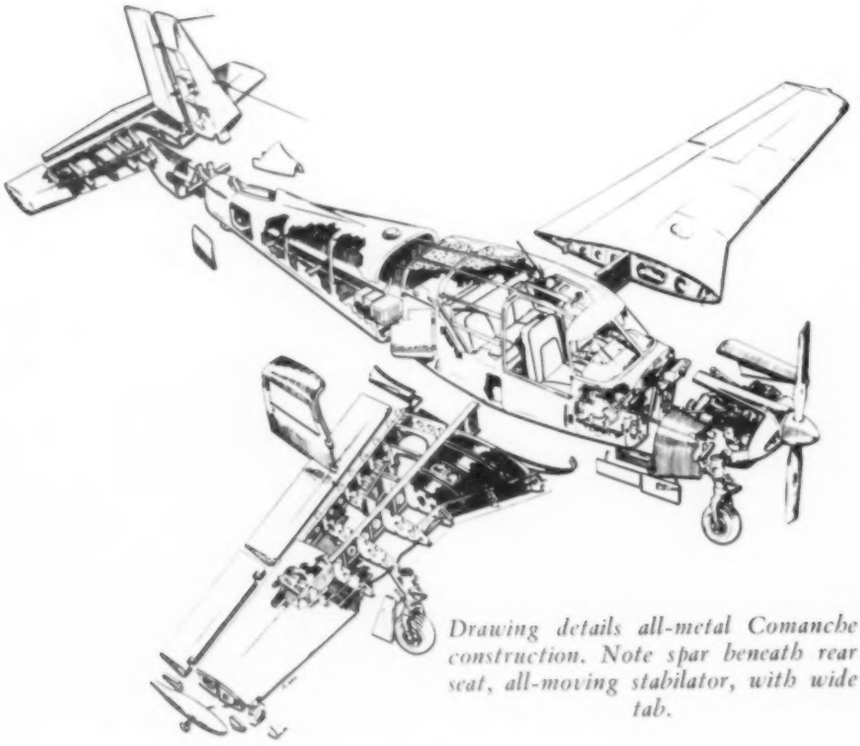
17L-8 VHF Communication Transmitter

A 3 watt VHF communication transmitter in 3" instrument case $8\frac{11}{16}$" long. Mounts on instrument panel. 90 consecutive 100 kc channels from 118.0 to 126.9 mc, crystal-controlled. Weight 5 lbs. including separate modular power supply 7 x $4\frac{7}{16}$ x $3\frac{9}{16}$", mounts anywhere. Transistorized modulator for 90% modulation with carbon mike. 27.5V DC.

Low-to-ground tricycle gear and wide span of Piper Comanche are emphasized in front view. Span is 36 ft., length 24.7 ft., height 7.3 ft., wing area 178 sq. ft. Note wingtip landing lights.

—(Piper Photos.)

New Comanche Leads Piper Line for 1958



Drawing details all-metal Comanche construction. Note spar beneath rear seat, all-moving stabilator, with wide tab.

THE first 1958 models of business planes made their appearance last month when Piper Aircraft Corporation at Lock Haven, Pennsylvania, took all of the wraps off their long-awaited 4-place, low-wing, all-metal Comanche; revealed the use of 160-hp. Lycoming engines on their Apache Twin and 4-place Tri-Pacer; boosted gross weight 300 lbs. and useful load more than 250 lbs. for the Apache, and listed refinements to their complete line.

Piper's family of airplanes for 1958 includes four basic models, with variations in each totalling nine in number. They are as follows:

Two-place Super Cub, 90-150 hp., $5,695 to $7,555, with agricultural version, including chemical dispersal equipment, $7,335 to $7,660.

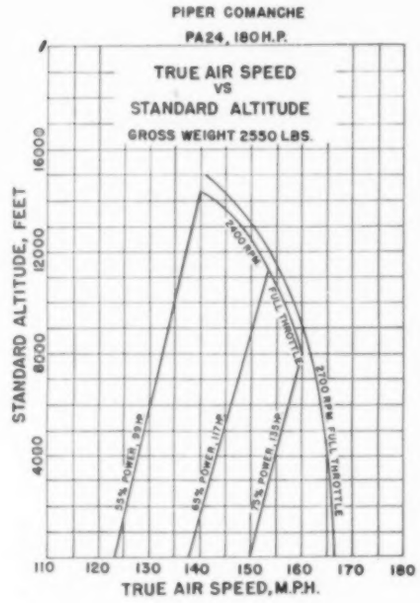
Four-place Tri-Pacer, 150-160 hp., $8,395 to $10,475.

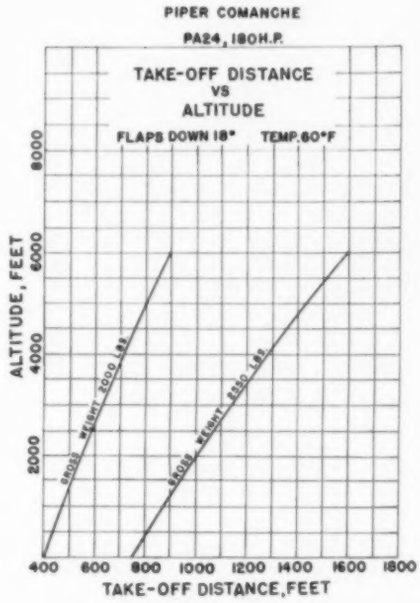
Four-place Comanche, 180-hp., $14,500 (250-hp. version to be offered later at time and price to be announced).

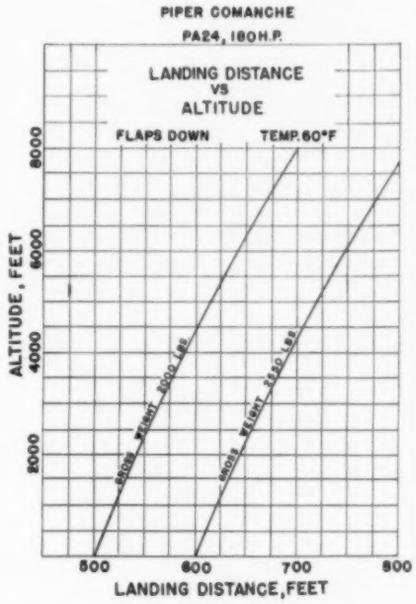
Four-five-place Apache Twin, 300-360 total horsepower, $34,990 to $40,-755.

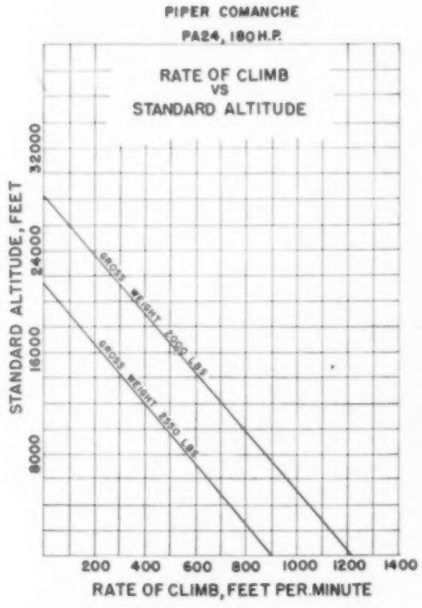
Newest and most-discussed Piper on the market is the Comanche, Piper's first low-wing tricycle of all-metal construction. Five Comanches were flying in mid-October, four of them "standards" with 4-cylinder 180 hp. Lycoming O-360-A1A engine and the fifth one an experimental "super" powered by a 6-cylinder Lycoming engine rated at 250 hp. Distributors and dealers are now having their first opportunity to evaluate the Comanche in personal hops. The first 8 Comanches will be used by the factory for

accelerated service testing. First deliveries following them will go to distributors. As of late October, Comanche No. 22 was on the production line. Orders from customers are not being accepted until the public has an opportunity to fly the new airplane, but distributor-dealer response has been so great that the first year's entire output is expected to be booked almost immediately. This production will reach at least five Comanches a day as the









Cabin roominess is suggested by view above. Panel has space at ends for radios. Note space between seats. Stabilator is set nose down at right.

With two 160-hp. Lycomings, Piper Apache gross weight has been boosted from last year's 3,500 to 3,800 lbs. These improvements will give the Apache more popularity than ever. Over 1,200 of the twins have been sold since the Apache was introduced in 1954. (Piper Photo.)

factory's new assembly lines reach full momentum.

The 180-hp. Comanche has already been CAA certificated and first complete performance and specifications were published in FLIGHT MAGAZINE last month. In brief, they are as follows: Top speed, 167 mph.; cruise speed, 160 mph. using 75% hp. at 8,000 ft.; stall speed, landing with flaps, 58 mps.; rate of climb, 910 mph.; service ceiling, 18,500 ft.; take-off run, 750 ft.; landing roll, 600 ft.; fuel capacity, 60 gals.; fuel consumption, 10 gph.; range 900 mi. @ 160 mph. and 8,000 ft. on 60 gals.; gross weight, 2,550 lbs.; empty weight, 1,475 lbs.; useful load, 1,075 lbs.; baggage capacity, 100 lbs. Accompanying charts depict the performance.

Minimum drag, high lift and good slow flight characteristics are claimed for the Comanche's laminar flow wing. A "flying tail," called a stabilator, reduces the size of the horizontal control surfaces and provides better controllability in all speed ranges. Of a design used on high-speed jets, the stabilator makes possible a tail surface area reduction said to be about 20% on the Comanche, with resultant savings in drag and weight over a conventional tail. It features a single-piece horizontal surface hinged at approximately 30% of mean chord so that it moves in its entirety when elevator controls are moved. A self-compensating anti-servo tab of generous proportions extends nearly the full length of the stabilator's trailing edge.

The Comanche's generous fuel supply consists of two 30-gal. rubber fuel cells, one in each wing. A filler neck extends about one inch down into the tank. When filled to the bottom of the neck, the tank holds 25 gals.; when filled to the top of the neck, 30 gals. An auxiliary electric fuel pump is provided for take-off and landing. Engine starting can be without the pump, however.

Electrically-operated tricycle landing gear retracts in 7 seconds with an electric motor installed under the front center floor boards. A switch in the left main landing gear prevents inadvertent retraction on the ground. The gear may be extended in flight in event of electrical failure by a telescoping lever just aft of the nose-wheel well. A single movement of the lever extends the gear.

The nose-wheel when extended engages with the rudder pedal system and is steerable through a 50-degree arc with the rudder pedals.

Single-disc hydraulic brakes are operated by a single hand brake which extends down from under the left instrument panel. Main air-oil landing gear struts are interchangable. All wheels carry the same size 600 by 6 tire.

Manually-operated flaps are used, operated by a lever on the floor between the two front seats. There are three extended positions — 9, 18 and 27 degrees.

In the cabin, a wide, deep instrument panel can accommodate 20 instruments as well as engine and fuel clusters, with a removable access plate over the panel for servicing. On either side is room for a wide variety of panel radio installations.

Exceptionally roomy cabin design features the Comanche, with 44.5-in. inside width. Two separate front seats are 4.5 ins. apart and are individually adjustable fore and aft over a 6-in. travel. The rear seat, almost four feet across, has an adjustable back. It can be quickly removed without tools. A rear baggage compartment provides 20 cu. ft. of space with a 20 by 22-in. outside door. The hat shelf behind the rear seat has 632 sq. ins. of area. Each passenger has a cooling air ventilator.

A 12-volt electrical system with resettable circuit breakers is used, with a 33-ampere-hour battery mounted on

the firewall for easy access. A 35-amp. generator is standard with 50-amp. generator optional. Standard lighting includes a landing light at the extreme outer end of each wing, navigation lights, instrument lights and cabin dome lights. The turn and bank indicator is also electrical.

More powerful 4-cylinder Lycoming engines are going into both the Apache twin-engine executive transport and the 4-place Tri-Pacer. They are the new 160-hp. Lycoming O-320-B engine. It weighs only 278 lbs., six pounds heavier than the 150-hp. O-320. It has a higher compression ratio of 8.5 to 1, uses 91-96-octane fuel and consumes .45 lbs. of fuel per horsepower hour as against .50 for the 150 hp. engine. The 150 is still offered as optional power for those who want to use 80-87-octane fuel.

The new O-320-B Lycoming measures 23.12 ins. high, 32.24 ins. wide and 29.56 ins. long. It is the sixth version of the 4-cylinder Lycoming line. Others range from the 108-hp. O-235-C1 to the 180-hp. O-360. The new O-320-B is equipped with Delco Remy starter, generator and voltage regulator as standard equipment. AN or diaphragm fuel pump drive, vacuum pump drive and constant-speed propeller governor drive are available as optional equipment. Features include rotator-type salt-cooled valves, all-chrome piston rings and nitrided crankshaft.

New exterior paint trim for the 1958 Apache is emphasized in this flight view.
—(Piper Photo.)

More Payload for Apache

The 1958 twin-engine Apache's major gain from the increase in total power from 300 to 320 hp. is a hefty 250-lb. boost in payload. This resulted when the gross weight was increased from 3,500 to 3,800 lbs., giving the Apache a useful load of 1,570 lbs.

1958 Piper Apache
Factory Data

Powered by two Lycoming O-320-B engines, each rated at 160 hp. at 2,700 rpm. for all operations.

Gross Weight, lbs.	**3,500**	**3,800**
Empty Weight, lbs.	**2,230**	**2,230**
Useful Load, lbs.	**1,270**	**1,570**
Standard Fuel Capacity, gals.	**72**	**72**
Total Fuel Cap. with Aux. Supply, gals.	**108**	**108**

Loading Options—

	With 4 Persons	**With 5 Persons**	**For Freight Use**
Empty Wt., lbs.	**2,230**	**2,230**	**2,230**
People, lbs.	**680**	**850**	**170**
Std. Fuel, Oil, lbs.	**444**	**444**	**444**
Total	**3,374**	**3,544**	**2,864**
Useful Ld. Remaining, lbs.	**426**	**256**	**936**
Gr. Wgt., lbs.	**3,800**	**3,800**	**3,800**
Top Spd., mph.		**183**	**183**
Cr. Spd., 75% hp., 7,000 ft., mph.		**173**	**171**
Fuel Consumption, 75% hp., gph.		**18.8**	**18.8**
Cr. Range, 72 gals., 75% hp., sea level, mi.		**650**	**640**
Cr. Range, 72 gals., economy cruise, mi.		**853**	**840**
Cr. Range, 108 gals., 75% hp., sea level, mi.		**950**	**940**
Cr. Range, 108 gals., economy cruise, mi.		**1,280**	**1,260**
Stall Spd., power off, flaps down, mph.		**59**	**61**
Take-Off Run, ft.		**900**	**1,100**
Landing Roll, flaps down, ft.		**670**	**750**
Best Rate of Climb Speed, mph.		**100**	**100**
Rate of Climb, fpm.		**1,480**	**1,260**
Single-Engine Rate of Climb, fpm.		**260**	**180**
Service Ceiling, ft.		**20,000**	**17,000**
Absolute Ceiling, ft.		**22,000**	**19,000**
Single-Engine Ceiling, ft.		**7,300**	**5,500**
Span, ft.		**37**	**37**
Length, ft.		**27.1**	**27.1**
Height, ft.		**9.5**	**9.5**
Wing Area, sq. ft.		**204**	**204**
Wing Loading, lbs., sq. ft.		**17.2**	**18.6**
Power Loading, lbs. hp.		**10.9**	**11.9**
Baggage Capacity, lbs.		**200**	**200**
Baggage Space, cu. ft.		**25**	**25**
Cargo Space (rear seat removed), cu. ft.		**80**	**80**

NOTES: Performance figures are based on tests run on a standard airplane under standard conditions as defined by CAA. Factory data from Piper Aircraft Corp.

Apache panel groups flight and engine instrument at center, with radios at left and right.
—(Piper Photo.)

This gives the popular little twin a wide range of loading options. Standard fuel capacity is 72 gals. but optional tanks boost this to 108 gals.

Cabin improvements have also been made in the 1958 Apache, with greatly improved seating provisions. In place of the previously standard full-width, fixed-position rear seat, two individual rear seats are now provided as standard. These, as well as the two front seats, are individually adjustable fore and aft and the back of each seat can be set in any of three positions from straight up to a comfortable reclining angle.

A fifth seat can be added easily and in moments by slipping it onto floor tracks which are standard equipment, located in the rear of the cabin. Thus the Apache can be operated as a 5-seater, with some space for baggage by the fifth seat. Optional adjustable head rests are available for all of the seats.

Another seating option provides two fully-reclining airline-type chairs which can be attached to the floor tracks in place of the standard rear seats.

For a small twin with the Apache's dimensions, this flexibility contributes significantly to the airplane's usefulness.

Other refinements have been made in the 1958 Apache. A new wing-root fillet at the leading edge improves the flow of air over the wing and tail surfaces at slow speeds for slower approach and touch-down speeds. 3,800-lb. gross weight, stall speed with power off and flaps extended is 61 mph., and landing roll is 750 ft.

Other performance at the 3,800-lb. gross weight includes 183-mph. top speed, 171-mph. cruise speed using 75% hp. at 7,000 ft.; 1,190-ft. take-off run; 100-mph. best rate of climb speed; 1,260-fpm. rate of climb; 95-mph. best single-engine rate of climb speed; 180-fpm. single-engine rate of climb; 17,000-ft. service ceiling; 5,500-ft. single-engine service ceiling; 640-mile range on 72 gals. at 75% hp. and at sea level, based on 18.8-gph. fuel consumption.

A new "hi-heat" carburetor air system has been incorporated for a larger volume of warmer air to the carburetor when needed. Piper says thorough tests have shown the new system capable of handling carburetor icing problems under the "worst possible conditions, yet results in less power loss when operating with the heat on." Carburetor air temperature gauges are standard equipment.

The new cabin heating system has been increased from 20,000 to 27,500-BTU rating with a Southwind gasoline heater. The nose landing light has been increased to 250 watts and is supplemented by a 100-watt taxi light mounted on the nose-wheel strut.

Three basic Apache models for 1958 with 160-hp. engines and their prices are as follows:

Standard Apache — 72-gal. fuel capacity; full equipment including lights, full gyro instrument panel, less radio, $35,990.

Custom Apache — Lear ADF-12-E automatic direction finder; Narco Omnigator Mk II with VOR/ILS navigation system, 75-mc marker beacon, tunable VHF receiver and 27-channel transmitter with 23 crystals installed; Narco Simplexer VHF receiver with 27-channel transmitter and 23 crystals installed, $38,945.

Super Custom Apache — All equipment listed above plus two 18-gal. auxiliary tanks; dual generators; dual vacuum system and heated pitot tube, $40,755.

The same three models, with 150-hp. engines, are priced $1,000 less at $34,990, $37,945 and $39,755, respectively.

Four-Place Tri-Pacer

With the new 160-hp. Lycoming engine, the 1958 four-place Tri-Pacer has a 141-mph. top speed and a cruising speed of 134 mph. at 7,000 ft. using 75% of power, at which fuel consumption is 9 gallons per hour. Standard 36-gal. fuel capacity gives

Individual ventilation outlets for air and individual rear seats, now standard, are shown in this Apache cabin view. Note fifth seat in rear, large windows. Head rests are available for all seats.
—(Piper Photo.)

New paint job for 1958 Tri-Pacer gives it more color. Note large license number on fuselage. Over 6,000 Tri-Pacers have been built. Four-place Tri-Pacer cruises 134 mph. with 160-hp. Lycoming engine. —(Piper Photo.)

it a 536-mile range with this performance and the addition of an 8-gal optional auxiliary tank extends this range to 655 miles.

Other performance includes 49-mph. stall speed with flaps extended; 800-fpm. rate of climb; and 16,500-ft. service ceiling.

The Tri-Pacer has an 890-lb. useful load for people, equipment, and fuel and baggage at a 2,000-lb. gross weight and 1,110-lb. empty weight.

In the cabin, front seats are individually adjustable and the rear seat has been designed with a higher back for comfort. The rear seat can be removed without tools to provide 42 cu. ft. of cargo space which can be loaded through the rear door. The 100-lb. capacity baggage compartment has a separate door on the right side. Seats have two-tone styling of silver-gray Nylo-saran with a choice of three colors to match the exterior paint scheme.

Over 6,000 Tri-Pacers have been built since their introduction in 1951. For simplified flying, the Tri-Pacer features interconnected rudder and

(Continued on page 50)

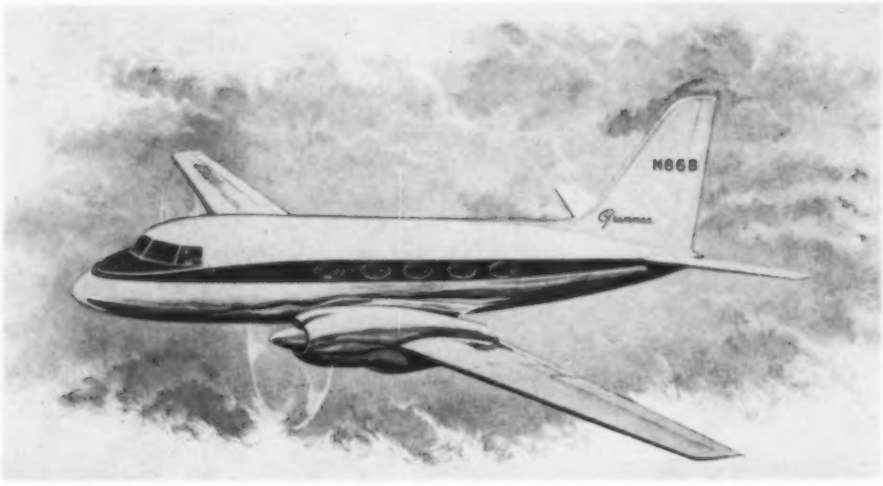
1958 Piper Tri-Pacer

Factory Data

Powered by Lycoming O-320-B engine rated at 160 hp. at 2,700 rpm, for all operations.	
Gr. Wt., lbs.	**2,000**
Empty Wt., lbs.	**1,110**
Useful Ld., lbs.	**890**
Fuel Cap., gals.	**36**
Opt. Fuel Avl., gals.	**8**
Top Spd., mph.	**141**
Cr. Spd., 75 % hp., 7,000 ft., mph.	**134**
Stall Spd., flaps down, mph.	**49**
Fuel Cons., 75% hp., gph.	**9**
Cr. Range, 36 gals., 75% hp., 7,000 ft., mi.	**536**
Cr. Range, 44 gals., 75% hp., 7,000 ft., mi.	**655**
Rate of Climb, fpm.	**800**
Svc. Clng., ft.	**16,500**
Abs. Clng., ft.	**19,000**
Span, ft.	**29.3**
Length, ft.	**20.6**
Height, ft.	**6.33**
Wing Area, sq. ft.	**147.5**
Wing Loading, lbs. sq. ft.	**13.5**
Pow. Loading, lbs. hp.	**12.5**
Bag. Cap., lbs.	**100**

NOTE: Specifications and performance figures are for standard airplane flown at gross weight under standard conditions as defined by CAA. Factory data from Piper Aircraft Corp.

Tri-Pacer front door opens to comfortable front seats and well-instrumented panel. Rear door, on left side of Tri-Pacer, opens to rear seat. —(Piper Photo.)



Grumman's Propjet Gulfstream

WILL the straight jet or the propjet be the most popular in the new family of high performance business air transports now in the works?

Grumman Aircraft Engineering Corp., Bethpage, Long Island, New York, believes the propjet will take the honors. It is building the prototype of a 12-14 place, 375-mph., 31,000-lb. transport identified as the Model 159 Gulfstream, powered by two 2,100-hp. Rolls-Royce Dart turboprop engines. Grumman promises 1959 deliveries to customers.

Sinclair Oil, Tulsa, Henry Boggess, chief pilot, is the first Grumman 159 purchaser. Other contracts are being negotiated. Base price is $700,000, fully-equipped price is $900,000.

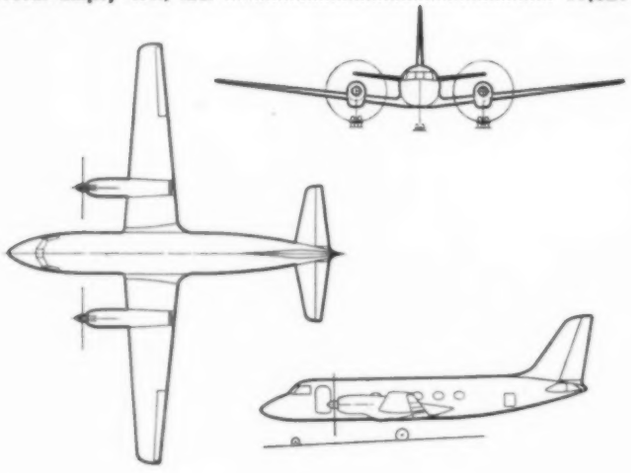
Confident it has the right formula for a modern corporate airplane, Grumman believes its Gulfstream is the most "realistic" design in its category yet offered on the business plane market. L. A. Swirbul, president, says: "Grumman has re-entered the commercial aircraft market with an airplane offering realistic operational features, with regard to speed, range and airport and altitude flexibility. The Grumman Gulfstream meets these present requirements, and incorporates into its design provision for growth in performance, and efficiency for the future — a factor which

Grumman Model 159 Gulfstream

Factory Design Data

Powerplants: Two Rolls-Royce Dart RDa-7/2 turbines driving 11.5-ft. diameter 4-blade Rotol propellers. Each engine rated at 2,105 equivalent shaft horsepower (eshp) at 15,000 rpm. for take-off.

Bare Wt. Empty, lbs.	16,932
Furnishings, Radio-Electronics and Autopilot, lbs.—	
12 passenger seats	480
Lavatory, galley, cabinets and wash water	170
Trim, curtains, floor covering	208
Soundproofing	104
Partitions	262
Food, liquids, magazines, etc.	143
Communications and navigation	570
Autopilot	160
	2,097
Total Empty Wt., lbs.	19,029



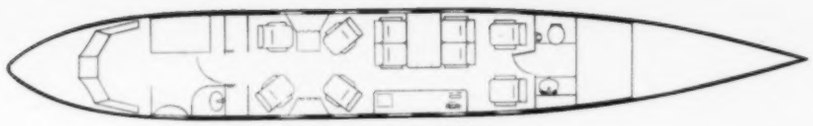
Operating Items, lbs.—	
2 Crew	340
Unuseable fuel	75
Oil	56
Water injection fluid	100
Crew baggage	80
	651
Basic Operating Wt., lbs.	19,680
Payload, lbs.—	
12 passengers	2,040
Baggage	480
	2,520
Zero Fuel Gross Wt., lbs.	22,200
Fuel, 1,304 gals. @ 6.75 lbs., lbs.	8,800
Take-Off Gross Wt., lbs.	31,000

Cruise-Range Performance, based on 31,000-lb. take-off weight, 25,000-ft. cruise, reserve fuel for 230-mile diversion and 3.4-hr. hold at 20,000 ft.—

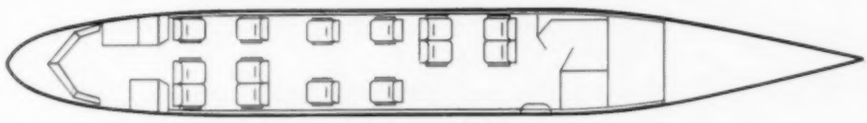
Mph.-miles-passengers-lbs. of baggage	370-1,760-12-480
Mph.-miles-passengers-lbs. of baggage	350-1,840-12-480
Mph.-miles-passengers-lbs. of baggage	350-2,200- 6-300
Rate of Climb, fpm.	2,300
Single-Engine Rate of Climb, fpm.	700
Rate of Climb at 5,000 ft., 31,000 lbs., fpm.	2,050
Single-Engine Rate of Climb at 5,000 ft., 31,000 lbs., fpm.	550
Single-Engine Service Ceiling (100-fpm.), ft.	17,500
CAA Sea Level Field Length, 31,000 lbs., ft.	3,970
Wing Span, ft.-ins.	78-6
Length, ft.	64
Height, ft.-ins.	22-9
Cabin Height, ins.	73
Cabin Length, ft.-ins.	32-8
Pressurization, cabin altitude vs. flight altitude, ft. 5,500 @	25,000

Equipment: De-icing boots, complete electronic and weather radar equipment; enclosed lavatory with hot and cold water; 100-cu. ft. pressurized baggage compartment in addition to 28-cu. ft. luggage space in cabin; 17.5 by 25.5-in. elliptical windows; all fuel carried in wings outboard of fuselage.

Drawings of cabin layout for Grumman 159 and DC-3 are to same scale and show similarity in dimensions. Grumman's cylindrical fuselage is pressurized for 5,500-ft. cabin altitude while cruising at 25,000 ft. and is air conditioned. Normal Grumman seating is 2 crew and 10-12 passengers but high density seating can accommodate 20 passengers.



Grumman 159 Gulfstream



Douglas DC-3

makes the Gulfstream a sound financial investment."

This Grumman confidence has been expressed also in the company's action in setting up three distributors for sales and service of the $900,000 business transport. They are Atlantic Aviation Service, Philadelphia; Pacific Airmotive, Burbank, and Remmert-Werner, St. Louis. Pacific Airmotive made the first sale, handling the Sinclair order.

Not as large as the Convair, the Gulfstream almost duplicates the familiar Douglas DC-3 in cabin size and physical dimensions. It has twice the speed of the 3, is a good 100 mph. faster than the Convair, and features a pressurized cabin for 5,500-ft. cabin altitude while cruising at 25,000 ft.

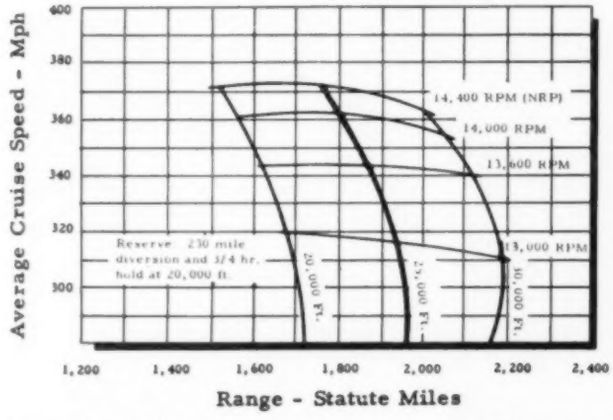
The Gulfstream's "realistic" performance consists of short-field characteristics enabling it to operate from 4,000-ft. runways and make a nonstop trip of 1,760 miles at 370 mph. with 230-mile reserve while carrying 12 passengers and 480 lbs. of baggage. This is for take-off at normal gross weight of 31,000 lbs. and cruise at 25,000 ft. and includes 45-min. holding at 20,000 ft. in addition to the 230-mile fuel reserve. Using a 350-mph. cruise speed, on the same basis otherwise, its range is 1,840 miles, and with 6 passengers plus 300 lbs. of baggage, this range can be extended to 2,200 miles at 350 mph.

Its rate of climb from sea level at gross weight is said to be 2,300 feet per minute. With one engine inoperative, it still has a 700-fpm, rate of climb from sea level. From 5,000 ft., these figures are 2,050 fpm. and 550 fpm. Its single-engine service ceiling is 17,500 ft.

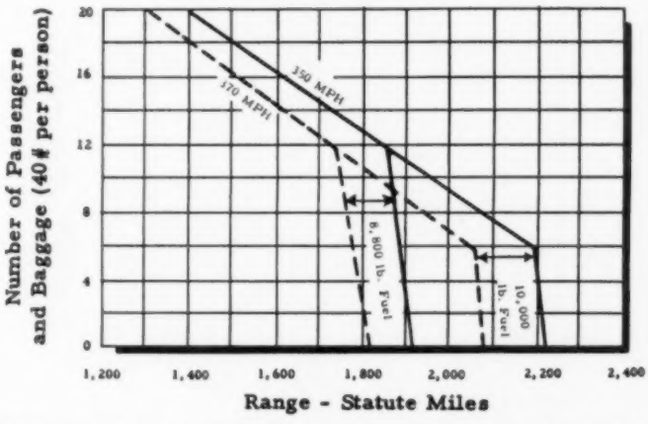
This range is for a normal fuel supply, all located in the wings outside of the fuselage, of 1,304 gallons, weighing 6.75 lbs. per gal. for a total

(Continued on page 68)

Take-off Performance

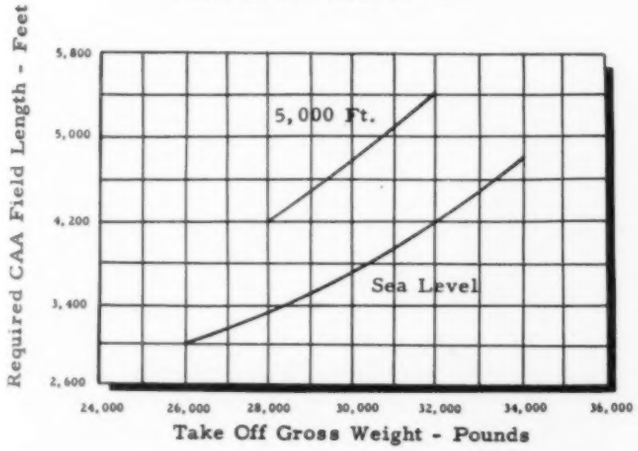


Climb Performance
(Normal Rated Power)

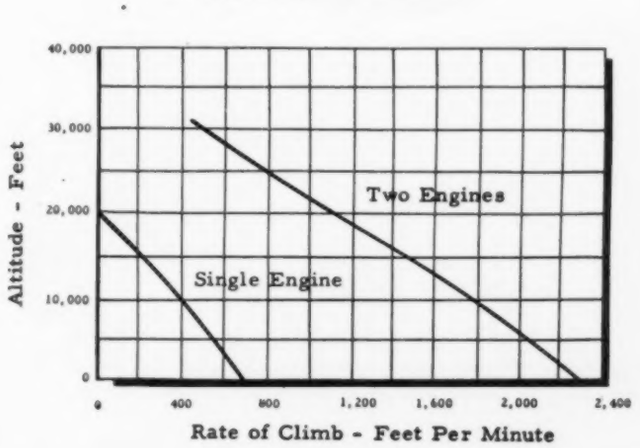


These charts plot design performance for the Grumman 159 Gulfstream, based on air transport category requirements. Rolls-Royce Dart RDa-7/2 engines are rated at 2,105 equivalent shaft horsepower for take-off at 15,000 rpm., with 14,400 rpm. for normal rated power.

Cruise Performance
(31,000-lb. Wt., 8,800-lb. fuel)



Passengers Versus Range
(25,000-ft. Cruising Altitude)



Heavy Hauls By Vertol Flying Crane

HEAVY hauling in the oil country has been demonstrated effectively by a commercial Vertol Model 44A on an extended tour which included offshore drilling platforms off the Louisiana coast. The tour not only convinced oil operators of the Vertol's ability as a versatile transport but gave increased significance to the helicopter's potential value as a flying crane for widespread industrial applications. Although it is a 19-passenger transport, the Vertol performed most of its heavy hauling with a sling, carrying loads up to 4,115 lbs. suspended beneath it on hooks.

The world's largest commercial helicopter, the Vertol 44 is powered by a 1,425-hp. Wright Cyclone 977C9MD1 (same as R-1820-103 in the military), which drives tandem counter-rotating metal rotors, each 44 ft. in diameter and having three articulated blades. Gross weight is 14,000 lbs., empty weight 8,655 lbs. and useful load 5,345 lbs. Its transport cabin is 20 ft. long, 5 ft. 6 in. high and 5 ft. 8 ins. wide — large enough for 15-20 passengers in addition to crew of two. Performance includes 100-mph. cruising speed, 1,050-fpm. rate of climb, hovering ceiling of 5,000 ft. in ground effect and 3,500 ft. out of ground effect, service ceiling of 10,600 ft., fuel capacity of 300 gals. with 75-gph. fuel consumption for cruising range of 360 miles. Over-all length is 52 ft. 6 ins. and height is 15 ft. 5 ins.

Three commercial versions are available, as follows: Model 44A, with over 2.5-ton useful load for cargo, $279,800; Model 44B, 15-passenger airline version, $294,800, and Model 44C, a 10-passenger executive version, priced according to customer specifications for equipment and interiors. Deliveries are available within 60 to 90 days after receipt of order.

On its first sales tour, Vertol util-

Here's the Vertol 44A at a drilling rig off the Louisiana coast. Note whitecaps indicating high winds.
—(Vertol Photo.)

Flying crane demonstrations show Vertol 44 with sling loads including 4,115-lb. mud pump and an all-metal field hut. Suspension of loads between tandem rotors offers stability in flight, including swinging cargo in turns. Loads are spotted precisely when landed, need no further positioning. Derrick and pipeline components were also flown.
—(FLIGHT MAGAZINE Photos.)

ized components of a drill rig, including a Lee C. Moore derrick, designed by the National Supply Company for helicopter transportation. This is an exploratory rig capable of operations down to 10,000-ft. drilling depth. Largest single component for it is a mud pump unit weighing 4,115 lbs. Total weight of the drilling rig is 176,656 lbs.

An analysis of a typical operation of transporting the National Supply rig shows that the Vertol 44 can move it over a distance of 50 miles in 6.5 days at a total helicpoter operating cost of $11,000, or $2.51 per ton mile. In out-of-the-way areas, lacking in highway facilities, airborne transport of the equipment is possible at great savings over the costs of expensive ground hauling for which roadways must be constructed by exploration crews.

The analysis for the 50-mile radius operation is as follows:

Round trips per 12-hr. day, 7.
Days required, 6.5.
Total flights, 43.
Total flight time, 56 hrs. 46 mins.
Direct operating cost per flight hr., $193.81
Project direct operating cost, $11,000.
Total ton miles flown, 4,391.
Cost per ton mile, $2.51.

The analysis is based on an assumed operating average of 800 hrs. annually. Vertol's standard domestic direct operating cost figures were used. Cost figures include only direct operating cost of the helicopter, including pilot and mechanic's salaries, fuel and oil, insurance, spare parts and depreciation. A 15-knot headwind out and a 15-knot tailwind return were assumed. No refueling at the 50-mile site is needed.

Figures by Vertol for moving the same equipment over a 100-mile range have also been furnished. These include re-fueling at the site and provisions for delivery of the fuel to the site. The 100-mile figures are as follows:

Round trips per day, 4.
Days required, 13.
Total flights, 51.
Total flight time, 132 hrs. 36 mins.
Direct operating cost per flight hour, $189.59.
Project direct operating cost, $25,140.
Total ton miles flown, 8,783.
Cost per ton mile, $2.86.

Here is an interesting summary of some of the details in Vertol's analysis of the 176,656-lb. drilling rig hauling job:

	50-mi. Radius	100-mi. Range
Fuel required, lbs.	868	1,181
Payload per flight, lbs.	4,194	3,881
Start and cargo hook-up, mins.	10	10
Outbound leg, mins.	40	80
Hover at site, mins.	5	5
Inbound leg, mins.	24	46
Rotor time, hrs. :mins.	1:19	2:21
Refuel time, mins.	0	15
Time between trips, mins.	20	20
Elapsed time per flight, hrs. :mins.	1:39	2:56
No. flights	43	51
Total fuel used, gals.	5,483	10,780
Total flight time, hrs. :mins.	56:46	132:36

Gray's ONE-ST

BEAUTIFY YOUR Beechcraft ....

NEW DELUXE CUSTOM UPHOLSTERING SERVICE

Your Beech 18 Twin can be finer than ever with Gray Aircraft Service Custom Modernization . . . Custom Cabin with longer, roomier interior . . . Rear Bulkhead Removal and Custom Baggage Compartment . . . Custom-crafted Upholstering, including complete rebuilding of chairs . . . Hand-finished cabinets . . . New Continuous-strip Dome Lighting . . . New Process Stay-Put Headlining . . . New Air Ducting for more headroom . . . Custom radio to save weight and space.

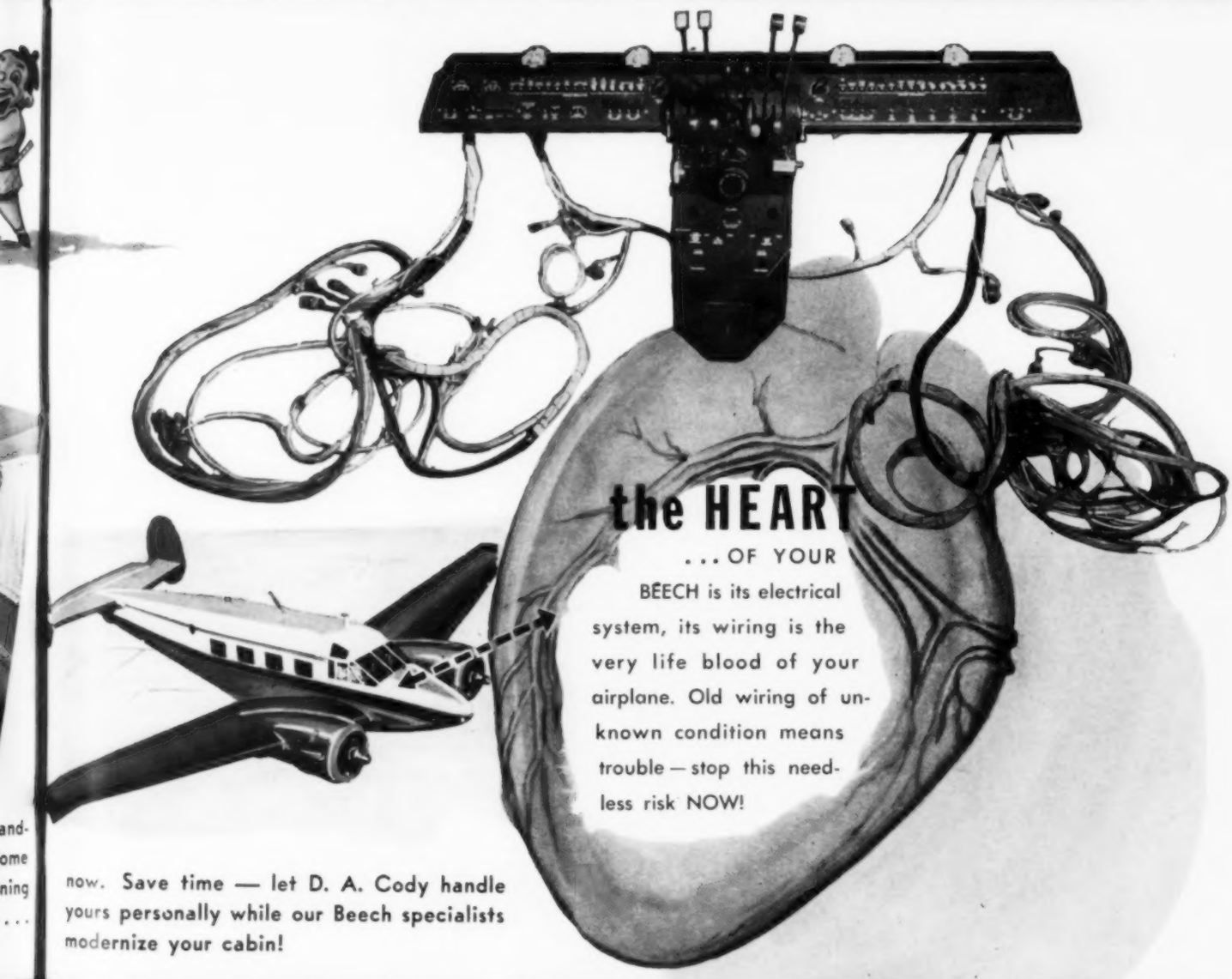
FROM 100 HRS TO THE NEXT
GRAY AIRCRAFT SERVICE at DALLAS
SAFE, DEPENDABLE SERVICE

MODERNIZE YOUR BEECH and protect its operation with Gray Aircraft Service's Certified Electrical System and New Custom Pedestal, featuring circuit breakers, completely safety-engineered nylon-covered, acid-resistant wiring and engraved panels.

To meet nationwide demands, we carry this custom equipment built up and in stock for convenient exchange and prompt installation. Modernize your Beech

STOP Beechcraft CERTIFIED SERVICE

KEEP "ON THE GO" With CUSTOM Wiring



the HEART

... OF YOUR BEECH is its electrical system, its wiring is the very life blood of your airplane. Old wiring of unknown condition means trouble — stop this needless risk NOW!

now. Save time — let D. A. Cody handle yours personally while our Beech specialists modernize your cabin!

Tel. FL7-3971
Res FL1-0571
D.A.CODY, Mgr.

DISTRIBUTORSHIPS
GOODYEAR CONTINENTAL
LYCOMING LEAR WILCOX

DEALERSHIPS
BENDIX
NARCO ARC

CERTIFIED BEECHCRAFT SALES & SERVICE

Gray AIRCRAFT SERVICE CO., Inc.

LOVE FIELD DALLAS

National Business Aircraft Association exhibits at Denver included many complete airplanes and equipped cabin mock-ups. Here's the Beech Super 18 cabin. Behind and above it is a Cessna 310 Twin.
—(FLIGHT MAGAZINE Photo by Paul Marcott.)

Business Aircraft Show

THE Denver gathering of the National Business Aircraft Association last month was highlighted by an excellent aircraft and accessory exhibit right in the middle of town, the largest turnout — 640 registrations — in NBAA history and a comprehensive series of forums on executive aircraft including jet and turbo-prop models not yet on the market.

It was a jam-packed program and registrants had difficulty attending all the meaty sessions while trying to take in the exhibit and talk over individual problems and desires with the tremendous number of industry representatives at the meeting.

Nearly everyone there agreed on two points. First, it was the most successful meeting and forum in the ten-year history of the organization; and second, the NBAA has "come of age."

Planes were displayed in downtown Denver, as this Trecker amphibian in a plaza pool shows. Below, J. L. Norton of Lockheed shows a JetStar model to pretty Phyllis Mathis.
—(FLIGHT MAGAZINE Photos by Paul Marcott.)

A great deal of credit for this obvious maturity is due Executive Director William K. Lawton and to Joseph B. Burns of the Fuller Brush Company, NBAA president, who was re-elected to the boss job for another year.

An oft-voiced constructive suggestion was that in future meetings when an aircraft exhibit is held that at least one afternoon session be allocated wholly to the exhibit as was done at the Dallas convention a couple of years ago.

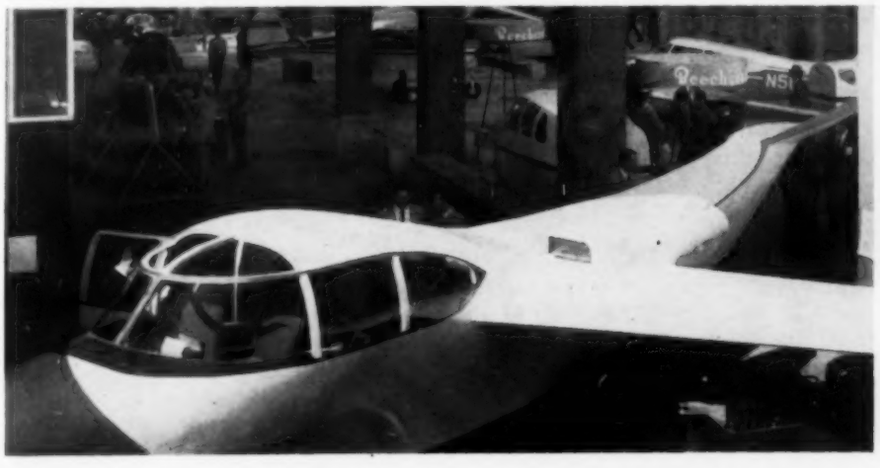
Peak audience interest generated during the forum sessions was in the presentations of new executive transports by factory representatives. Skeets Coleman, speaking for Fairchild, announced 67 firm orders in the bag for the F-27 and pointed out the advantages of the high-wing design for stability, for unimpeded view and absence of glare. He said it was the most completely tested aircraft being produced today for commercial operators, what with two airplanes used for static tests and two for flight tests. He also stressed the point that with so many local air lines purchasing the Friendship, parts and maintenance availability will be automatic in every section of the country. The short-field characteristics, the lessened fire hazard from low vapor pressure fuels, turboprop versatility at all altitudes and savings in fuel costs were emphasized. A basic Friendship costs from $590,000 to $650,000, raw.

Bernie Herman of Grumman held forth on the new pressurized 10-12-passenger Gulfstream, which also mounts turboprop power. "The turboprop is here to stay," says Herman, "and it operates without embarrassment in heavy traffic." Certification should be completed by March of '59 and they are well along with production tooling. The first flight should be May of next year. A cruise of 370 mph. at 25,000 feet is predicted for this low wing, which grosses 31,000 pounds. Grumman says every Gulfstream will be customized by the distributor. Fully equipped, the airplane will probably sell for around $900,000 with a $700,000 price tag on the basic factory airplane.

On Mark Engineering Company's "Marksman" was detailed by Robert O. Denny of Van Nuys, California, where a new plant is going up. First two sales are to Maytag and Phillips, with the first delivery scheduled for April, 1959, and one-a-month production thereafter. Denny says the Marksman is in the 450-mph. class and boasts the best range capabilities of all the designs thus far announced. It can handily use 4,000 foot runways and under a 40,000-pound gross re-

Beechcraft Travel Air, newest of the small twins, had its first public showing at NBAA meeting. Engines are 180-hp. 4-cylinder Lycomings.

New on the market is the 4-place Piper Comanche, seen in Denver display. At $14,500 base price, it cruises 160 mph. with 180-hp. Lycoming.



Full-scale mock-up of the twin-jet, 8-place, 400-mph. Acme Triphibian was shown at Denver (above). Colorado-built 2-place Forney Aircoupe (below) occupied a prominent display spot.

Numerous companies participated in the NBAA meeting with elaborate equipment displays. Here's part of the Bendix Radio spread, featuring airborne weather radar.

—(FLIGHT MAGAZINE Photos by Paul Marcott.)

Lear's Paul Momenteller (right) shows the Lear equipment to "Miss ADF-100" and Sime Bertolet of Reading Aviation Service.

Collins Radio's Denver exhibit featured new lightweight equipment for business planes, displayed so that is could be operated. Bell Helicopter displayed its popular 4-place Model J executive copter cabin (below).

quires only 2,070-foot landing roll. Price of complete Marksman with custom interior and installation of all electronic equipment should be in the $1,180,000 bracket.

Vickers-Armstrongs of England announced a forthcoming executive version of its airline-proven Viscount powered by four Rolls-Royce Darts of the latest design. Basic price was quoted as $1,080,000 plus custom interior, radar, duty and delivery. Duty runs 12½ per cent.

Main conversation piece, however, was the pure-jet Lockheed JetStar Model 329 which boasts a 500 mph.

(Continued on page 52)

William E. Hinton (left) of Chrysler Corp. and H. S. Christensen of ARC Radio look at a new ARC package unit.

—(FLIGHT MAGAZINE Photos by Paul Marcott.)

President C. E. Woolman examines model of jet airliner. Delta has ordered $100,000,000 of new aircraft. Jetliner service begins in 1959.

Golden Crown Hospitality

Another in a series on the care taken by leading airlines to maintain top flight efficiency– and why this care has led them to select CHAMPION SPARK PLUGS. Noted aviation authority reports on America's No.1 Certificated Airline, **DELTA AIR LINES...**

by HERB FISHER

I like mine rare – and I got it rare!

That's a part of Delta's "firsts." It's a part of what makes Delta different—earthy southern hospitality in the wild blue yonder.

Golden Crown Hospitality is Delta's coronation of the three regal requisites—Safety, Service and Dependability – that underlie operation of a truly successful airline.

HERB FISHER
international aviation authority, veteran test pilot, author

"Firsts" come naturally for the airline-with-a-heart, President C. E. Woolman will tell you:

Delta holds Certificate No. 1—America's first certificated airline. Delta was the first airline to offer packaged summer vacations to Miami and the Caribbean. First to provide DC-7 service to and through the South. First to provide reserve seating on Chicago-Miami nonstop service. First, as part of its Crown hospitality, to give passengers their choice of steaks—rare, medium or well-done!

I got at the grass roots of Delta hospitality recently at the airline's Atlanta headquarters. With everyone there—from airline president to porters, from flight crews to ground crews—the passenger is prince. His safety and comfort are paramount.

"Delta operates by the Golden Rule," President Woolman said. "We simply put ourselves on the customer-side of the counter, treat our passengers as we would like to be treated. We believe an airline has a responsibility to the public over and above what's required by the price of a ticket."

Flying Scot coach flights as well as Golden Crown luxury flights have made Delta one of the most popular airlines in the nation. Royal monarchs of the skyways, of course, are those 365-mph DC-7's embossed with the Golden Crown seal of supremacy. These pace-setters for the airlines of the world are truly a Golden Crown interlude in the life of a passenger.

Delta Aircraft at the Atlanta Terminal.

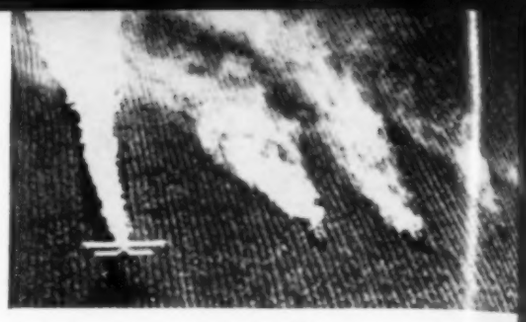
Delta began in 1924 as the world's first commercial crop-dusting outfit . . . graduated to transportation in 1929 with three 6-passenger Travelaires . . . today operates 74 modern transports – DC-7's, DC-6's, Convair 340's and 440's, Constellations, DC-3 and C-46 cargo planes.

Delta serves 60 cities in seven countries, covers 10,765 route-miles, flies more than a billion passenger-miles annually, employs close to 6,000 people. Employee turnover is the lowest in the aviation industry – an enviable record.

This progressive airline keeps its passengers as it does its employees, thus daily disproving the old belief that a big company outgrows its earlier personal relationships with individuals.

Today, just as in 1924, "C. E.'s" office is open to all – new mechanic or old pilot. The president's open-door policy has made Delta a "family" organization in which each employee feels that his personal role is important in the development of his company. This policy has kept dignity in the character of Delta as well as in the individual; has fostered inherent, genuine southern hospitality; has heightened operational efficiency; has made this airline a favorite of the millions who enjoy its service in the United States, Cuba, Jamaica, Venezuela, Haiti, Puerto Rico and the Dominican Republic. It has helped boost Delta from "firsts" as a pioneer airline to "firsts" in its present stature among the nation's largest airlines.

Examining heart of powerplant, the ignition system (L/R): Larry Watson, Powerplant Gen. Foreman; Fisher; L. W. Carlton, Gen. Foreman; Dean Miller, Specialist Group Supervisor.



Delta began operations in 1924 as world's first commercial crop-dusting company.

Delta recently received an Award of Honor from the National Safety Council. It's axiomatic that the Number 1 airline in safety must be equally as high-ranking in maintenance. One manifestation of this fact is the Delta "first" in using X-ray in its aircraft overhaul inspection. Also typical of Delta's leadership in operating the finest, safest equipment is the Collins Radar Weather Eye. This radar development enables the pilot to survey his weather 150 miles ahead, guaranteeing passengers a velvet ride.

"Maintenance certainly is the crux of a superior operation," President Woolman told me. "Without good maintenance the finest pilot in the world is hard-pressed to conduct a good flight. Over the years, we've always put quality-of-maintenance in top position in our operation. We never economize in maintenance, in the quality of materials going into maintenance."

There isn't a stick-man behind a fan today who wouldn't say "amen" to that! As a long-time test pilot myself, I can swear to it.

Vice-Pres. C. H. Dolson and President C. E. Woolman (L/R) show Fisher the original No. 1 Airline Operating Certificate issued by C.A.A. Delta received it Aug. 22, 1938.

Charles H. Dolson, Vice-President—Operations, said it for me as I probed the heart of Delta's operation there at Atlanta: "Just as maintenance is never-ending, so is evaluation and re-evaluation of all airline methods, procedures, processes, materials and accessories. Vital aircraft equipment undergoes extensive, exhaustive testing and re-testing here.

"Such is it with Champion Spark Plugs, for example. Delta has been using Champions since 1944."

At this Atlanta overhaul base, I saw firsthand Delta's consummate efforts to provide passengers with the very best in safety, service and dependability. I was struck by the painstaking attention to detail throughout Delta maintenance.

Overhaul is done in 24 shops on a progressive or block basis, thus providing lower downtime on fewer aircraft over shorter periods . . . and more available aircraft during peak traffic periods.

Lewis Carlton, General Foreman of Overhaul, showed me the intricacies of the operation that now gives Delta a daily utilization of 11 hours on aircraft that formerly lent themselves to only six hours' utilization per day.

"I've had experience at digging into the reasons for engine trouble," Mr. Carlton said, "and I can truthfully say that only in very rare cases can you rightfully blame the trouble on spark plugs. When an engine starts to cough or backfire, first thing many airlines want to do is change spark plugs."

Mr. Carlton told me about the causes of engine trouble that Delta has turned up—none of them having anything to do with the vital heart of the Delta aircraft ignition system, the Champion Spark Plug.

"Matter of fact," he added, "I've had a set of secondhand Champions in my own 65-hp Aeronca since 1952 – over five years! – and they're still running perfectly. Sure, I fly 'em! I fly to and from work—I depend on those spark plugs to get me there on time, too—and, in checking my log book recently, I found I'd cleaned those spark plugs just once and have a grand total of 760 hours on them. Furthermore, they're still good!"

Referring back to Delta's 13-year use of Champions, Mr. Carlton said: "We ought to tie our Delta slogan, 'There's No Compromise with Safety,' to the Champion slogan,

Southern hospitality from the heart makes for lasting friendships. It's a Delta tradition. Sky Lounge of this DC-7B is warmly decorated in tan, white, aqua and gold.

Delta flight crew chatting before takeoff (L/R): 1st Officer E. N. Thomas, Stewardess Nancy K. Shiels, Capt. James Dalton, 2nd Officer Eugene Caverly, Stewardess Betty J. Brantley.

Champion Spark Plugs, typical of Delta's use of only the very finest in aircraft parts and equipment, are being gapped by Delta mechanic H. L. Mang.

Economics of the Delta Air Lines operation are discussed by (L/R) Fisher; K. T. Wilson, Purchasing Agent, and W. H. Hobbs, Buyer for Delta's Purchasing Department. "Champion maintains a high-quality product at reasonable cost," Mr. Hobbs reported. "With Champions, Delta achieves dollar economy in long life as well as in dependability," Mr. Wilson said.

'Dependable Safety,' and make it: 'There is No Compromise with Dependable Safety.' "

And there is no compromise when the life-beat of the aircraft heart depends on Champions. That was the feeling I found shared by all technicians, specialists and supervisors in Delta's maintenance and overhaul operation – an operation that today includes more than 50 majors a year.

"To achieve greater service life on an engine and its components, Delta is always receptive to service tests of other equipment," Dean Miller, Delta Specialist Supervisor, told me. "A vendor's product must meet our own rigid standards as well as those of the appropriate government agency. Champions meet our rigid test standards and experience requirements."

Larry Watson, Delta Powerplant Overhaul General Foreman, knows ignition systems and spark plugs inside and out. He referred to Champions as "the most dependable, trouble-free spark plugs available today." He credited Champion with having helped Delta attain and maintain its present stature as a top airline in efficiency and dependability.

The purse-string holders in any business are the centrifugal forces of decision. Yet in the airline business economy is measured as much by dependability as by dollars and cents. "We don't buy solely on a price basis, but rather on a basis of what's the best product to accomplish the purpose at hand," K. T. Wilson, Delta Purchasing Agent, told me. With Champions, Delta achieves dollar economy in long life as well as in dependability.

"My constant aim for Delta is to secure the right materials in the right quantities at the right time and at the right price to support an efficient and economical operation," Mr. Wilson said. The record indicates Champion has been right for Delta these past 14 years. Champion providing a short lead-time on its product makes it possible for Delta to carry a minimum inventory of spark plugs and, hence, keep its dollar investment at the lowest minimum.

"We've never had any delivery difficulty–and we've never received a spark plug shipment containing rejectable material," said W. H. Hobbs, Buyer for Delta's Purchasing Department.

Champion has thus contributed to Delta's tripodal success in Safety, Service and Dependability . . . and Delta has firmed its top position among big airlines with a monumental base of southern hospitality.

"This is just the beginning," Operations Vice-President Dolson reported: "We have on order right now over one hundred million dollars' worth of new aircraft — more DC-7's plus DC-8's and Convair 880's – 18 four-engine jet airliners.

"Here's a sample flight schedule we plan to have in effect within two years:

"Chicago to Miami – two hours, 25 minutes.

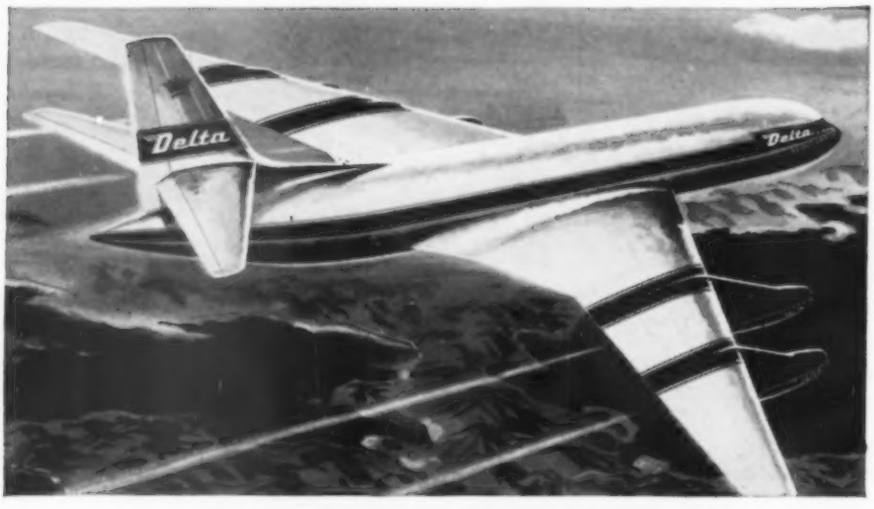
"New Orleans to Chicago–one hour, 54 minutes.

"Atlanta to Dallas–one hour, 37 minutes.

"Houston to Washington–two hours, 40 minutes.

"Atlanta to New York–one hour, 36 minutes."

The Dim Past – A 6-passenger Travelaire in flight in 1929, Delta's first year of passenger service.



The Immediate Future – This 600-mph Delta jetliner will be in service in less than 2 years.

Discussing Delta's top safety record (L/R): C. B. Wilder, Technical Operations Director; Fisher; A. C. Ford, Engineering Superintendent; G. J. Dye, Maintenance Superintendent.

And you can bet there'll be more *firsts* for the airline-with-a-heart when Golden Crown Hospitality spans the skies on jet wings.

New Addison Airport is now open for executive, business and private aircraft

You're always cleared to land at Addison Airport, because Addison is away from congested traffic patterns. You save time, getting on the ground quickly, and when you are on the ground, you'll find service is fast and friendly. Gasoline trucks are operated from the Terminal building by two-way radio for extra quick service.

Addison Airport's runways are planned for use in almost every kind of weather condition. The principal, hard-surfaced runway is 4,500 feet long, 100 feet wide, and is on headings of 150 degrees and 330 degrees—ideal for the prevailing winds in the Dallas area. Also, there is a second cross-wind runway 3,200 feet long and 200 feet wide. This hard packed sod runway has headings of 30 degrees and 210 degrees and will handle equipment as large as DC-3's.

At the modern, completely air-conditioned Terminal building, you'll enjoy the comfortable lounge, clean restrooms, and a coffee shop for snacks or full meals. Rent cars and taxis are available to transport you quickly to downtown Dallas.

At the new Addison Airport, you'll find Humble top-quality aviation fuels and lubricants quickly available. Humble aviation products are produced by the most modern of refining procedures, and they are continuously improved to keep pace with the rapid advances in modern aircraft engines. When you refuel at Addison Airport, or at any airport displaying the Humble sign, you can be sure that you're getting the best in aviation fuels and lubricants.

HUMBLE

AVIATION PRODUCTS

HUMBLE OIL & REFINING COMPANY

Texas air tour barbecue on ramp in front of air-conditioned private terminal opened new $2,291,000 Addison Airport for business flying in Dallas last month.

Business Flying's Finest Private Airport

ADDISON Airport has been opened for operations in Dallas, 8 miles north of Love Field, as the world's finest, most completely equipped private airport for executive flying.

With clear approaches for its 4,500-ft. main runway, which is 100 ft. wide and paralleled by a taxiway connecting both ends, the new $2,291,000 facility was designed for business planes up to and including Convair transports in size. It is open 24 hours a day with beacon and complete lighting for night flying and features a Collins terminal omni range (TVOR) for instrument approaches. This private omni range has already been installed on the northeast side of the airport and was scheduled for commissioning during November.

The privately-financed and operated business flying center was constructed by a group of Dallas business men to fill the growing need for a fully-equipped airport devoted exclusively to business flying. It was built on a 400-acre site offering ample space for expansion when necessary and served by leading streets and a railroad, the latter offering possibilities for future development of industrial sites across the main runway from the hangar row. Its backers are W. T. Overton, John Murchison, Toddie Lee Wynne, Jr., W. D. DeSanders and James I. DeLoache. Henry Stuart is vice president and general manager.

Operations center around an air-conditioned, 5,000-sq. ft. terminal building, with Unicom radio communications on 122.8 mc., weather teletype, luxurious lobby with restaurant, offices and restrooms. Already in operation are two large private hangars, 160 ft. square each and with 30-ft. door heights, of Collins Radio Co. and Delhi-Taylor Oil Co., and 102 T-hangars. Construction will begin immediately on two 100 by 120-ft. additional hangars for Associated Radio Co. and Dal-Tex Aviation.

Collins Radio's hangar will be used for its fleet of airplanes as well as for installations and modifications for radio and electronic equipment in

Air view shows Addison Airport's lay-out, with 102 T-hangars on each side of large hangars in foreground. More large hangars are going up on each side of terminal at center. Airport is headed by W. T. Overton, shown at mike with George Haddaway.

First two private hangars on Addison Airport are these Delbi-Taylor Oil (left) and Collins Radio Company structures, each 160 by 160 ft. with 30-ft. door heights for aircraft as large as Convairs.

commercial and military aircraft. There are several Dallas Division plants in operation by Collins, which also operates a service hangar facility at Red Bird Municipal Airport south of the city on the other side of town from Addison Airport. The firm has plans for a large new factory in the Richardson community 5 miles away.

Dal-Tex Aviation's hangar will be a Cessna sales and service operation, which is to be moved to Addison from Highland Park Airport, about 4 miles away. The hangar will have a large shop and office addition.

Custom aircraft radio and electronics service and installations will be performed in its Addison hangar by Associated Radio, which will retain its headquarters at Love Field. This hangar will also have a large office and shop addition.

Aircraft sales offices will be available at the terminal for other operators desiring to locate on the new airport.

Henry Stuart, manager, said Avis rental autos are maintained on the ramp for fly-in customers. The restaurant is open between the hours of 6 a. m. until 10 p. m. and will remain open 24 hours daily when operations are in full swing. Box lunches are available, with other flight needs.

Glassed-in private terminal has operations office at left on ramp, offices and restrooms at center and restaurant at right. Humble Oil fuel trucks operate station at sign on left. Lounge and restaurant scenes are shown below. Unicom radio is shown being worked by pretty Wanda Jenkins.

Here's the 1958

FIVE-SEAT CAPACITY

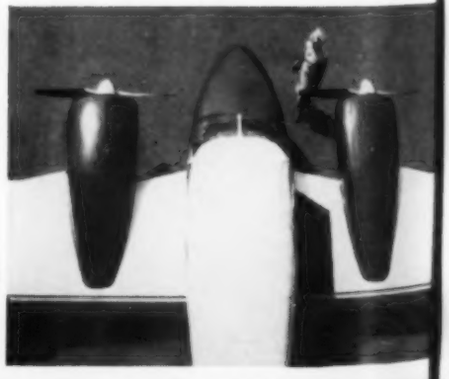
The Apache has the biggest, most comfortable cabin of any plane in its class. Standard seating arrangement includes four individually adjustable seats, deeply upholstered and styled to suit the most discriminating taste. Fifth seat (optional) can be quickly slipped onto tracks at rear of cabin.

GREAT NEW CABIN COMFORT AND BEAUTY

"Quiet, comfortable, beautiful"—these words describe the Apache's big, roomy interior. Each seat has a three-position reclining back and is adjustable fore and aft. New optional head rests provide truly relaxed travel. For the ultimate in comfort, two reclining airline-type chairs can be installed in rear.

DOUBLE SWEPT LEADING EDGE

with new wing root fillets provides improved air flow at low speeds for better control. Apache takes off quicker, lands shorter than any other twin.



PIPER *Apache*

. . . with more power, more speed, more payload

Now the world's most popular executive twin is powered with new, more efficient, high-compression Lycoming 160 hp engines for better fuel economy yet higher cruising speed, better all around performance and nearly 300 pounds of added payload!

The beautiful new 1958 Apache cruises over 170 mph with a whopping 1,570-pound payload, enough weight allowance for five passengers and 108 gallons of fuel (72 gallons in main tanks, 36 in optional auxiliaries) for a range of more than 1,200 miles.

The most thoroughly proven light twin on the market, and by far the most popular, the new 1958 Apache with its increased payload and performance represents more than ever the best possible investment for round-the-clock, night and day transportation with twin-engine reliability. $35,990 standard, completely equipped less radio. See your Piper dealer or write for new brochure, Dept. F-11.

PIPER
AIRCRAFT CORPORATION
LOCK HAVEN, PA.

MORE PEOPLE HAVE BOUGHT PIPERS THAN ANY OTHER PLANE IN THE WORLD

Tandem Super Cub for 1958 comes in 90-hp. and 150-hp. versions, with $5,695 basic price for 90-hp. version. —(Piper Photo.)

1958 Piper Super Cub

Factory Data

Engine	Model 95 Cont. C90	Model 150 Lyc. O-320	Model 150 Seaplane Lyc. O-320	Ag. Model Equipped Lyc. O-320
Hp.-rpm.	90-2,475	150-2,700	150-2,700	150-2,700
Gr. Wt., lbs.	1,500	1,750	1,760	2,070**
Empty Wt., lbs.	800	930	1,190***	1,060
Useful Ld., lbs.	700	820	570	1,010
Top Spd., mph.	112	130	115	105
Cr. Spd., 75% hp., mph.	100	115	103	90
Stall Spd., mph.	42	43*	42*	45*
Take-Off Run, ft.	390	200*	700E	300*
Take-Off Over 50 Ft., ft.	750	500*	990E	950*
Landing Roll, ft.	385	350*	430*	410*
Landing Dist. from 50 ft., ft.	800	725*	730*	875*
Best Rate of Climb Spd., mph.	71	75	75	75
Rate of Climb, fpm.	710	960	830	760
Best Angle of Climb Spd., mph.	63.5	45	58	55
Best Angle of Climb, ratio	1-8	1-5	1-6.5	1-9
Svc. Ceiling, ft.	15,750	19,000	17,500	17,000
Abs. Ceiling, ft.	17,750	21,300	19,500	19,000
Fuel Cons., gph.	5	9	9	9
Fuel Cap., gals.	18	36	36	36
Bag. Cap., lbs.	50	50	50	50
Cr. Range, 75% hp., mi.	360	460	412	360
Span, ft.	35.3	35.3	35.3	35.3
Length, ft.	22.4	22.5	23.9	22.5
Height, ft.	6.7	6.7	10.3	6.7
Pow. Loading, lbs. hp.	16.6	11.6	11.7	13.8
Wing Loading, lbs. sq. ft.	8.4	10.0	10.0	11.6

NOTES: *Flaps extended. **Gross weight over 1,750 lbs. permitted for special purpose uses under CAR Part 8. ***Seaplane empty weight includes starter and electrical system. E-estimated. Factory data from Piper Aircraft Corp.

World's most popular agricultural airplane is the 150-hp. Piper PA-18-A, available either as duster or sprayer or with a combination installation convertible to dust or spray. —(Piper Photo.)

PIPER'S NEW MODELS

(Continued from page 31)

aileron controls and people have soloed it on many occasions after one day of instruction. The Tri-Pacer is of fabric-covered welded-steel construction with aluminum wing spars and ribs and Piper Duraclad non-flammable plastic finish for the fabric covering.

Prices for three 1958 versions are as follows:

Standard Tri-Pacer — Equipment includes metal propeller, starter and generator and basic instruments, $8,595.

Custom Tri-Pacer — Navigation, cabin and instrument lights, strut fairings, sensitive altimeter, 27-channel Narco VTA-3 VHF transmitter with 3 crystals, plus Narco LFR-3 low-frequency range and standard broadcast receiver, $9,270.

Super Custom Tri-Pacer — Landing lights, engine-driven vacuum pump, full gyro panel, Narco Superhomer with omni system, 12-volt VHF transmitter with 9 crystals and tunable VHF receiver, plus Narco LFR-3 low-frequency receiver and homing loop, $10,475.

With 150-hp. engine, the Tri-Pacer prices are $8,395, $9,070 and $10,275, respectively.

Approximately 85% of the Tri-Pacers are the Super Custom model.

Super Cubs

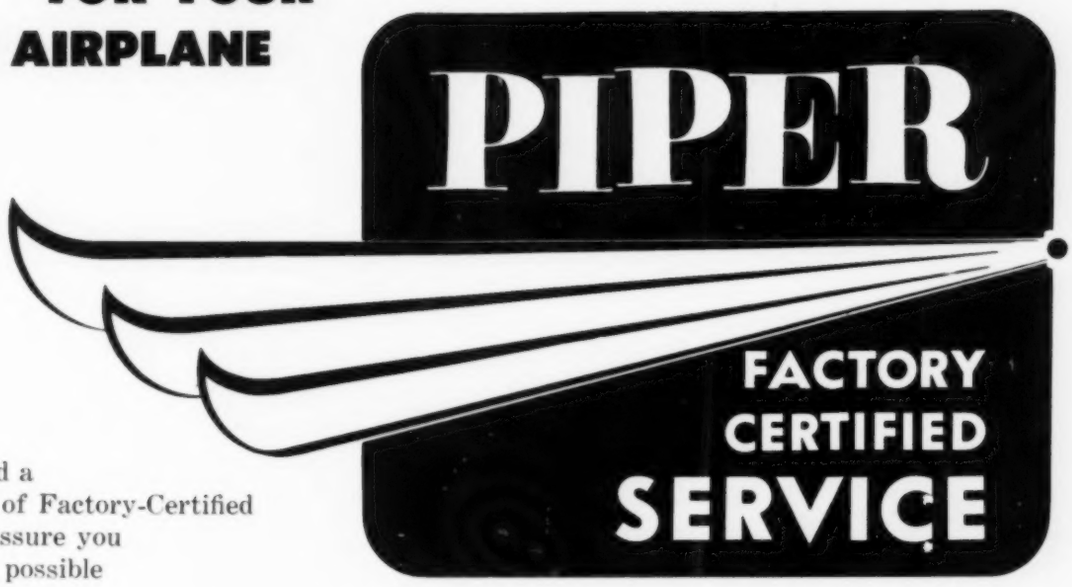
Two basic models of the 2-place Super Cub are offered for 1958, with seaplane and agricultural versions. The Super Cub 95 is powered by a 90-hp. Continental engine and the Super Cub 150 is powered by a 150-hp. Lycoming engine. The 150 is equipped with flaps, can take off and land in 50 yards and is widely used for many purposes including border patrol, mountain rescue, ranch work and hauling men and materials into inaccessible areas.

Basic price of the Super Cub 95 is $5,695, with a deluxe version at $6,420, while that of the Super Cub 150 is $7,150, with a deluxe version at $7,555.

The agricultural version is the 150-hp. Piper PA-18-A, world's largest selling agricultural airplane. It is available as either a sprayer, duster or combination unit quickly convertible for either spraying or dusting. Its 110-gal. hopper is loaded through a large hatch aft of the wing. The PA-18-A is equipped with wire cutters on the landing gear, heavy-duty seat belt and shoulder harness. A "quarter-ton-truck" version without rear-seat controls is also offered for cargo carrying.

The standard PA-18-A is priced at $7,335 and a deluxe version is $7,660.

HERE'S THE SIGN OF THE FINEST SERVICE FOR YOUR PIPER AIRPLANE



Piper has established a world-wide network of Factory-Certified Service Centers to assure you of the finest service possible for your Piper airplane.
To earn the coveted designation, service organizations must meet rigid requirements, must be properly equipped and staffed by personnel who have attended the intensive service school conducted at the Piper plant.
Dozens of Piper Factory-Certified Service Centers have been established throughout the nation and around the world, and more are being designated to assure convenient and competent Piper service wherever you may wish to fly.

FOR THE BEST IN PIPER SERVICE AND MAINTENANCE VISIT THE PIPER FACTORY-CERTIFIED SERVICE CENTERS LISTED BELOW

ANDERSON AVIATION CO., INC.
Sky Harbor Airport
P. O. Box 5175
BRidge 5-5741
Phoenix, Arizona

ATLANTIC AVIATION SERVICE, INC.
Philadelphia International Airport
P. O. Box 5318
SAratoga 6-7500
Philadelphia, Pennsylvania

AVIATION SPECIALTIES COMPANY
Gallup Municipal Airport
P. O. Box 1241
UNion 3-3621 *UNion* 3-5394
Gallup, New Mexico

BROWNING AERIAL SERVICE
Municipal Airport
P. O. Box 1173
HOmstead 5-1728
Austin, Texas

ELLIOTT FLYING SERVICE, INC.
Davenport Municipal Airport
P. O. Box 418
2-2689
Davenport, Iowa

GILLIS FLYING SERVICE
Logan Airport
P. O. Box 2098
2-2288
Billings, Montana

J & J AIRCRAFT, INC.
Sarasota-Bradenton Airport
821 *General Arnold Road*
ELgin 5-6868
Sarasota, Florida

KEN-MAR AIRPARK, INC.
Ken-Mar Airpark
Box 2667, *University Station*
MUrray 3-6589
Wichita, Kansas

LOUISIANA AIRCRAFT
Downtown Airport
P. O. Box 1428
WAlnut 1-9618
Baton Rouge, Louisiana

OKLAHOMA AIRCRAFT SALES CO.
Ponca City Municipal Airport
P. O. Box 709
ROgers 5-3375
Ponca City, Oklahoma

RED AIRCRAFT SERVICE, INC.
Broward County International Airport
Building 78
JAckson 3-9624
Fort Lauderdale, Florida

SKYMOTIVE, INC.
O'Hare Field, Chicago International Airport
Chicago Telephone TUxedo 9-2100
P. O. Box 448
Park Ridge, Illinois

SOUTHERN FLIGHT SERVICE, INC.
Douglas Municipal Airport
P. O. Box 1211
EXchange 9-6374
Charlotte, N. C.

SPARTAN AIRCRAFT COMPANY
Aviation Service Division
Tulsa Municipal Airport
TEmple 5-4491
Tulsa, Oklahoma

ST. LOUIS FLYING SERVICE
Lambert Municipal Airport
Box 6067, *Lambert Field Station*
PErshing 1-0450 & *PErshing* 1-1770
St. Louis, Missouri

Howard Aero Service operated the large display above at the NBAA meeting to show features of its 300-mph. Super Ventura executive transport. A General Motors display of a cutaway Allison turboprop engine at the NBAA show was enjoyed by a corps of children in wheelchairs from the Boettcher School at Denver, which visited the show for educational purposes.
—(FLIGHT MAGAZINE Photo by Paul Marcott.)

AIRCRAFT SHOW

(Continued from page 40)

cruise (FLIGHT MAGAZINE, October, 1957, pp. 26-28). The military prototype is now flying and some token deposits have been taken, although there won't be any assurance of commercial production until after the military places an order.

The engine people had a field day during the turboprop symposium, which was dominated by Rolls-Royce. One of the most newsworthy announcements on power plants was made by David Sykes of Vickers, who stated that Capital Airlines is getting as much as 1,500 hours on their Darts between major overhauls. Other encouraging news on turboprop power improvements came from Allison Division of GMC and from D. Napier & Son with their Eland conversion program. The Eland NEL6 turboprop engine is rated at 3,500 eshp. for take-off and is for Convair conversions.

Corporation pilots delved into current operating problems and practices on current airplanes such as the DC-3, Lodestars, Learstars, Beech 18, Venturas, Convairs and the light twins. Other panels included the CAA's business flying program, weather flying and the business aircraft and company managerial and operational policies, the latter bogging down into a hodge-podge of controversial issues such as pilot non-flight duties, flight time limitations for pilots and co-pilots, pilot proficiency, pilot authority, company policy manuals, etc. While it made for interesting conversation, very few panelists saw any hope for agreement within NBAA ranks as too many of the subjects lapped over into the area of management control. One thought we had in passing: that NBAA sponsor a pamphlet for uninitiated corporation executives who might be planning to adapt aircraft to their particular companies, setting forth the importance of sound pilot-management relationships and citing various corporation procedures generally recognized as contributing to over-all safety and better aircraft utilization. This job could be done without jumping into the field of controversial issues.

Outside speakers included James T. Pyle, CAA Administrator, David G. Davis, director of aviation for the city of Denver, and Elwood R. Quesada, President Eisenhower's special assistant for aviation facilities planning and chairman of the Airways Modernization Board. Igor I. Sikorsky was presented with the NBAA 1957 Meritorious Award and his sparkling remarks covering his own aviation history and that of the helicopter were considered by many as the climax of the meeting.
—G. E. H.

Airmen's Calendar

Nov. 11-15—9th Annual International Air Safety Seminar, sponsored by Flight Safety Foundation in cooperation with Coast Guard and USAF Military Air Transport Service.

Nov. 12-13—7th Aircraft Hydraulics Conference, sponsored by Vickers, Inc., Park Sheraton Hotel, Detroit.

Nov. 13-15—Annual NATA Convention, Hotel Adolphus, Dallas.

Nov. 15—National Pilots Association Annual Convention, Hotel Adolphus, Dallas.

Nov. 18-20—Annual Beech Distributors Meeting, Wichita.

Nov. 20-22—ADMA's 30th Meeting, Sheraton Cadillac Hotel, Detroit.

Nov. 20-22—National Aeronautic Association Annual Convention, Hotel Sheraton, Fontenelle, Omaha.

Dec. 6-7—Montana Aviation Trades Association Annual Meeting, Havre, Montana; Walter C. Hensley, chairman.

Dec. 16-18—Air Traffic Control Symposium, "Mission and Methods of the Airways Modernization Board." For information, write Air Traffic Symposium, Franklin Institute Laboratories, 20th and Parkway, Philadelphia 3, Pa.

Jan. 20-Feb. 7—Two-week Short Course, Aviation Institute for Commercial and Business Pilots, University of Southern California, Los Angeles.

GREAT BALLS OF FIRE is the best description for the Air Force Convair F-102A when it launches a salvo of 2.75-in. rockets. It carries 24 of the killers on all-weather interceptor missions. Blast of fire occurs two-tenths of a second after firing (top).
—(Convair Photo.)

The Riley Twin's Got Everything

***180-mph. Trips *144.5 Gals. Standard Fuel *Up to 1,500-Mile Range**
***1,400-fpm. Rate of Climb *Go-Anywhere Short-Field Performance**
***Unmatched Ruggedness, Stability, Flying Ease**
***Luxurious Interior *Airline Panel**

Trade Now for a Riley Twin—for Less Cash Than Any Other Twin!

You'll cash in on performance and features worth twice the price — all the advantages you'd specify if you designed it yourself — lowest price . . . lowest operating costs . . . most dependable single-engine performance including 6,000-8,000-ft. single-engine ceiling . . . long engine life for lowest possible maintenance with 170-hp. 4-cylinder Lycomings and full-feathering, constant-speed Hartzell props . . . most comfortable, quietest, best ventilated and heated light twin cabin . . . most visibility . . . two large luggage compartments with outside doors . . . full equipment is standard. Trade now for less cash difference than for any other light twin.

Riley
twin BY TEMCO
Jack Riley
11223 Cinderella Lane Dallas, Texas
FL 1-1721

NATIONWIDE ROUNDUP:

New Business In the Hangar

DALLAS AERO SERVICE is in the final stages of certification tests on a new Lodestar speed kit including new tail cone, reduced flap travel for elimination of trailing-edge knobs and cowl clean-up. Ship is Russell Firestone's Lodestar of Dallas, Bill Powell, pilot. . . . Last month's interesting jobs included D. Harold Byrd's Lodestar of Dallas, piloted by George May, in for complete conversion including speed kit, new interior, new radio and Bendix radar. . . . Banco de Mexico has a new 4-engine de Havilland Heron Executive, Carlos Barja, pilot. DAS is installing flares, oxygen system, electrical outlets and miscellaneous items. . . . Fifty-amp. generators and Americanized electrical controls have gone into Tate Taylor's Helmerich & Payne Dove from Tulsa. . . . In for 100-hour jobs were Jim Ketner's Texas Eastern Gas DC-3 from Shreveport, Bob Dodson's British-American Oil Lodestar from Dallas, Buck Carter's Lion Oil Lodestar from El Dorado, Bob Kaiser's Utex Exploration Lodestar from Salt Lake City, Tom Hecklin's Dallas-based Tecon Corp. Super 18 Beech, John Teat's Sun Oil Super 18 Beech from Dallas, and Aero Commanders from Wichita Falls belonging to A. R. Dillard and Jim Harrison. . . . Wally Tingley brought in the Shell Oil Dove from Midland for 1,800-hr. overhaul.

ATLANTIC AVIATION, Philadelphia International Airport, one of three distributors for the new propjet Grumman Gulfstream, has named Alan M. Scripture as eastern sales representative for the 375-mph. executive transport. Stewart Ayton, Atlantic Aviation vice president, said deposits have been taken on the Gulfstream and that demonstrations can be arranged for 1958.

REMMERT-WERNER at Lambert Field, St. Louis, another Grumman Gulfstream distributor, is designing a special interior for the propjet executive transport, which is sold without furnishings. This original interior will soon be flying in an R-W Douglas DC-3 demonstrator. The Grumman's cabin is almost a duplicate of DC-3 dimensions. This makes it possible for Remmert-Werner to fly a Gulfstream custom interior long before the Gulfstream itself flies. Remmert has taken deposits already but has not identified the buyers. Flight demonstrations are expected during or after August, 1958.

The Garrett Corporation's **AIRESEARCH AVIATION DIVISION** at Los Angeles International Airport is completing installation of its Maximizer kit on the DC-3 of Tobin Aerial Survey, San Antonio. Chief Pilot Bill Hubbard brought it in and will also get new de-icer boots, a large baggage door, new headlining, cold air system and an exterior paint job. . . . Pilots George Fleming and Paul Caribelle brought in the DC-3 belonging to Sears Roebuck's Los Angeles Division for new de-icer boots, AiResearch aileron boost tab and Maximizer aileron gap strip. . . . The U. S. Industries Convair 440 was delivered after completion of a custom interior, exterior paint job, wing fuel tanks, engine analyzer and integrated flight system. . . . Paul Petris, pilot for Arizona Public Service, brought his Beech 18 in for dual heaters and exterior painting. . . . Garrett's own DC-3, "Queenie," is getting Maximizer kit installation, interior refurbishing and wing removal and reinstallation.

HARRISON HOLZAPFEL has been promoted to be manager of the Garrett Corporation's AiResearch Aviation Service Division at Los Angeles, succeeding Jack J. O'Brien, who has been named manager of Garrett's AiResearch Manufacturing Co. at Phoenix, Arizona. Holzapfel, for-

(Continued on page 58)

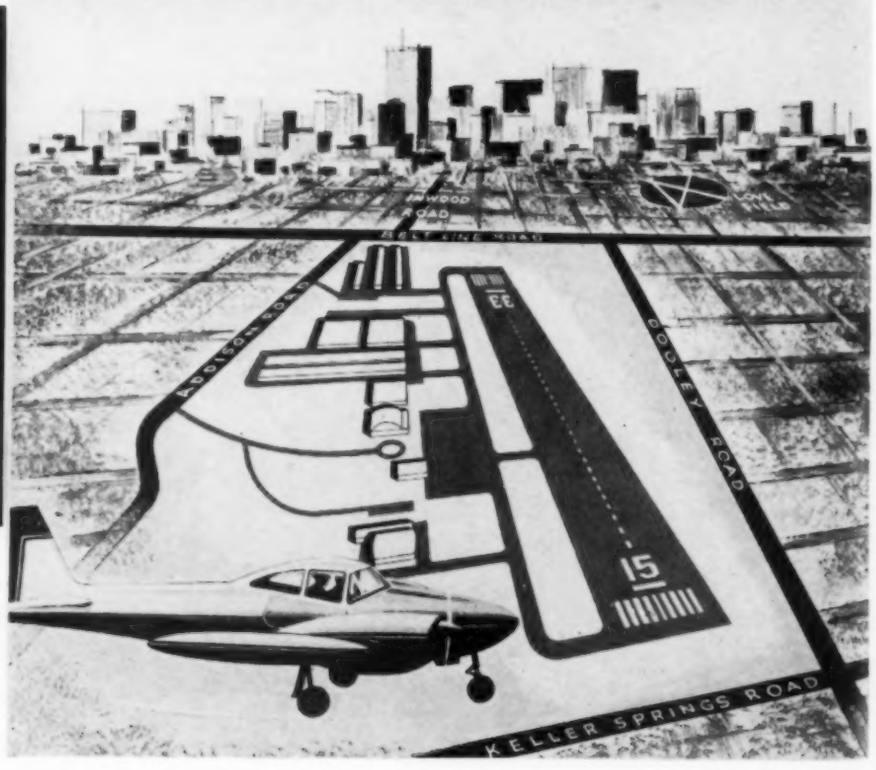
NOW OPEN

for EXECUTIVE, BUSINESS and PRIVATE OPERATORS

The NEW Addison Airport

4,500-foot Asphaltic Runway, 150°-330° Headings
Complete Ground, Ramp and Flight Service
122.8 Megacycles Unicom
Terminal and Restaurant Facilities
13 Miles from Downtown Dallas
Hangar Storage

TVOR
Ground Transportation:
Limousine, Taxi, Rent-A-Car



ADDISON AIRPORT
P. O. BOX 14201 • DALLAS, TEXAS

Night view shows new L. B. Smith Aircraft hangar busy with executive aircraft servicing. Firm is one of nation's largest modification centers.

L. B. Smith's New Base

AVIATION leaders from all over the country attended the formal opening last month in Miami of the new million-dollar facilities of L. B. Smith Aircraft Corp. The new facilities embrace 80,000 sq. ft. of floor space in a large cantilever hangar on a 24-acre plot at 5700 NW 36th St., Miami International Airport.

Herrol Bellomy, executive vice president and general manager, said streamlined production by expert craftsmen keynoted planning of the new factory and hangar. LBS Aircraft employs 500 men and women and is one of the largest aircraft modification, overhaul, conversion and service centers in the country. It is completely equipped for all types of aircraft. It is part of L. B. Smith Industries, which employs 1,800 workers and has an annual payroll of $8,725,000. Another division, Aerosmith Products, specializes in aircraft seating and custom equipment and unveiled its new line of executive, passenger and crew seats at the opening. The firm's revolutionary new Aeroserve Tray was introduced.

Large new air-conditioned pilots' lounge is shown at right. Below is an airview of the large new cantilever hangar and ramp, located on a 24-acre site on Miami International Airport at 5700 NW 36th St. L. B. Smith conversions fly the world over.

AUTHORIZED
Cessna
SERVICE

These Authorized Stations Feature Flat-Rate Service

Aircraft Sales Company
Meacham Field
Fort Worth, Texas

Champ's Aviation, Inc.
Municipal Airport
El Paso and Lubbock, Texas

Clinton Aviation Company
Stapleton Airfield
Denver, Colorado

Cruse Aviation, Inc.
International Airport
and Clover Field Airport
Houston, Texas

Dal-Tex Aviation, Inc.
Highland Park Airport and Love Field
Dallas, Texas

Executive Aircraft Company
Municipal Airport
Kansas City, Missouri

Hair Flying Service
Harding Field
Baton Rouge, Louisiana

Poelman Aircraft Co.
New Orleans Airport
New Orleans, Louisiana

Ragsdale Flying Service
Municipal Airport
Austin, Texas

Kenneth Starnes Aviation Service
Adams Field; Little Rock, Arkansas

Southwestern Skyways, Inc.
Municipal Airport
Santa Fe, New Mexico
and Ogden, Utah

Sunny South Aircraft Service, Inc.
Broward International Airport
Fort Lauderdale, Florida

Walston Aviation, Inc.
Civic Memorial Airport
East Alton, Illinois

Yingling Aircraft, Inc.
Municipal Airport
Wichita, Kansas

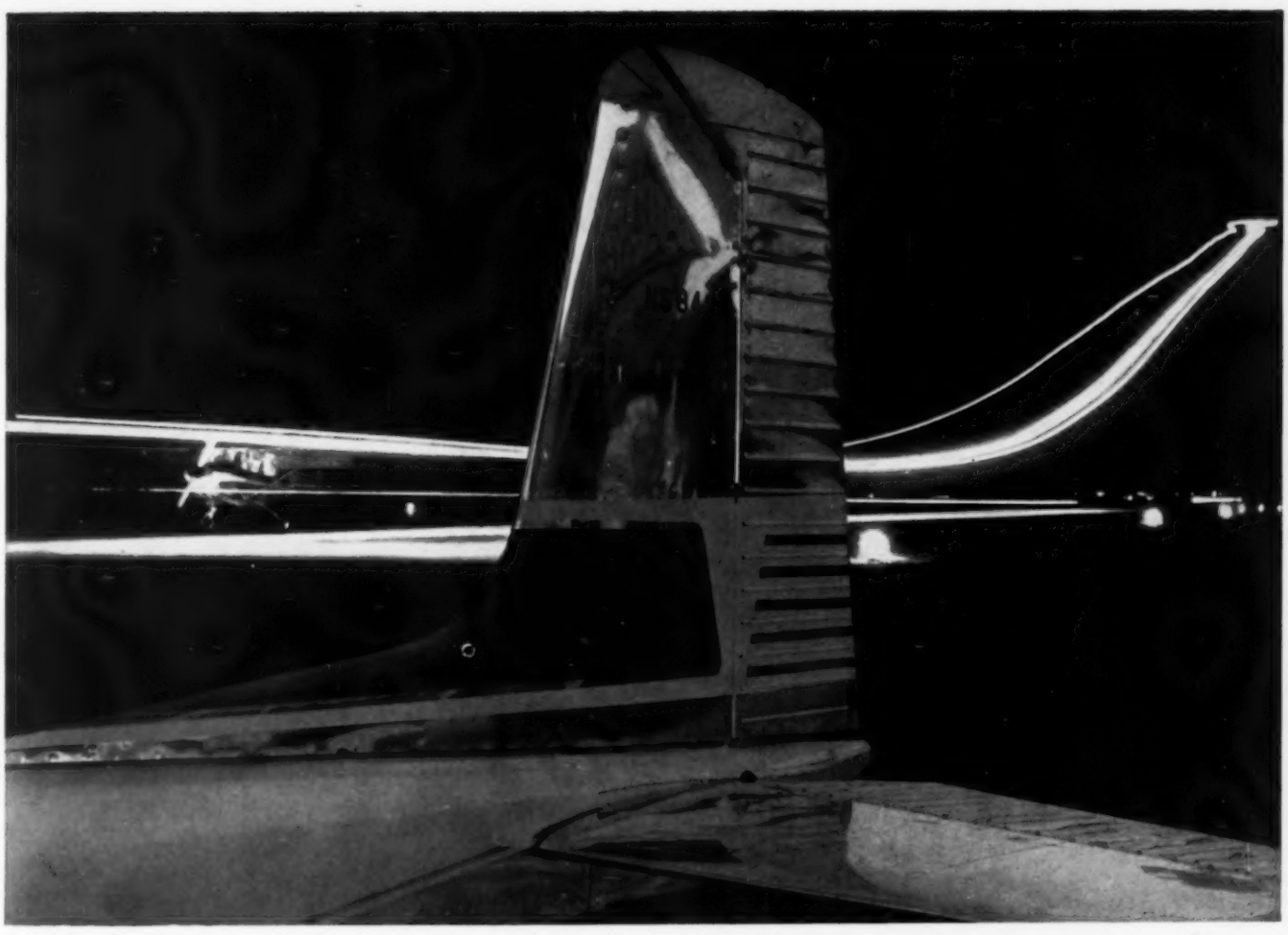
SERVICE SATISFACTION

SMILING SERVICE is what you expect and always receive when our Authorized Cessna Service Stations solve your maintenance needs! We furnish factory skills, factory equipment and factory satisfaction. Cessnas are our specialty . . . and we follow a policy of giving Cessna users a little more, a little better service — LIKE OUR FAMOUS 1-2-3 CESSNA FLAT-RATE SERVICE!

1 You get an accurately quoted price and time-required quotation based on hundreds of job studies covering virtually all maintenance needs.

2 You get genuine Cessna parts and factory-trained workmanship.

3 You save money and time and we stand behind every job for your fullest satisfaction.



Performance with a new *Flair!*

NEW CESSNA 182 COMBINES PERFORMANCE, HIGH-WING STABILITY, LAND-O-MATIC SAFETY—IN AN EXCITING NEW LOW-SLUNG DESIGN!

Stability with a new *Flair!* **Comfort with a new *Flair!*** **Speed with a new *Flair!***

Here's the amazing flight package that cannot be matched by any other single-engine airplane:

Only the Cessna 182 in its class delivers top or near top performance in all ways: short take-off . . . fast high climb . . . long range . . . slow rate of descent—and it costs less than any other plane in its class.

And for 1957, this all-round best airplane wraps it all up with a brilliant new flair in design!

You'll see a new inches-lower silhouette with the look of motion in every line. It makes this great new 182 easier than ever to handle . . . on the taxi strip, down the runway, into the air!

For Cessna's wide-span Land-O-Matic landing gear is now even wider and lower-slung—more stable than ever. Combined with Cessna's high-lift wing and lower center of gravity, it brings you easier, more positive control.

You'll see a new kind of cabin styling . . . a sleek, unhampered look featuring new comfort-recessed front seats, big new high-backed rear seats—plus luxurious new fabrics with textures and colors galore! New, more functional instrumentation. New, automobile-easy parking brake. Even new door closures for quietness.

The dramatic new Flair Flight Cessna 182 is priced (with std. equip.) at $13,975, f.a.f. Wichita. See and fly it now at your Cessna dealer's—Yellow Pages of phone book—or write CESSNA AIRCRAFT CO., Dept. FM 12, Wichita, Kansas.

Cessna

Inquire about Cessna lease plans

GREAT CESSNAS 170 172 180 182 THE COMPLETE AIR FLEET FOR EVERY BUSINESS NEED

HANGAR BUSINESS

(Continued from page 54)

mer engineering manager for Western Airlines, has been assistant manager of AiResearch Aviation Service.

HORTON & HORTON CUSTOM WORKS, Meacham Field, Ft. Worth, has installed its 18th Gold Crest interior in Baroid's Aero Commander 680 from Houston, Bill Miller, pilot. Natural grasscloth headlining, gold and white "cloud" seat fabric, gold Scotch-grain leather and woven-wood draperies were highlighted by gold-plated screws, washers and jeweler's gold engraved crest. . . . Tony Zuma, Tennessee Gas Transmission aviation head, Houston, had one of his Cessna 310's styled to match the fleet. . . . Moran Drilling's Beech 18 from Wichita Falls, Hardin Miller, pilot, refreshed their interior with rugged grey gros-point frieze seat conversions, grey tweed carpeting and printed linen draperies. . . . Bell Helicopter's famous 4-place Model J Rangers were recently delivered with Horton & Horton custom interiors to Dennis O'Conner (Aztec gold and brown) and Tom O'Conner (bluebonnet blue and alpine white), ranchers at Victoria, Texas; Cuba's minister of public works (sky blue and dawn grey) and to Cully Weadock, vice president, Chesapeake and Potomac Airways, Baltimore (sky blue and smoke grey).

ROLLS-ROYCE OF CANADA plans to increase manufacturing and overhaul capacity at its Montreal factory to meet the growing demand for Rolls-Royce propjet engines in Canada and the U. S. A new Dart overhaul line will be added and spare parts will be increased in stock to provide 30-day delivery service to users of Rolls-Royce engines.

EXECUTIVE AIRCRAFT SERVICE, Garland Airport, Dallas, has installed a Bendix radar and pitot masts in a Central Airlines DC-3. . . . R. W. (Wimpy) Neal brought in the E. W. Brown, Jr. DC-3 from

MORRISON-KNUDSEN'S DC-3 crew, Pilot George Oswald (right) and Co-Pilot Steve Sandemeyer, are pictured at Horton & Horton Custom Works in Ft. Worth planning their flight back to Boise, Idaho, after receiving a new interior.

Orange, Texas, for right engine change, periodic inspection and miscellaneous repairs. . . . RCA radar has been installed in a United Gas Lodestar from Shreveport for Cotton Jeter, who also had the radio relocated and augmented with new equipment. . . . A 1,000-hr. inspection was performed on the Texas Gas Transmission DC-3 from Owensboro, Kentucky, piloted by Kenneth Jolly with Richard Peck as mechanic. EAS installed new anti-ice system, short stacks, 200-amp. generators, sealed-beam landing lights, hi-intensity wingtip lights, ARC Course Director and Barber-Coleman automatic heat controls. . . . In for periodic checks were the Sid Richardson DC-3, Stein Lee's Gulf Oil Lodestar and the Republic Natural Gas Lodestar.

REMMERT-WERNER at Lambert Field, St. Louis, is installing lightweight landing gear doors on Ralph Piper's entire fleet of DC-3's. . . . Shelby Maxwell brought in Burlington Mills' Super-92 DC-3 for lightweight landing gear door installation and a double engine change. . . . Walter Word brought in Montex Drilling's DC-3 for lightweight landing gear door installation. . . . Marvin Eide and Charles Russell have had R-W's lightweight landing gear doors installed on their Sears Roebuck DC-3. . . . Max Jobst brought in the Indiana Gear Works DC-3 for an engine change. . . . Tom Griffith has had lightweight landing gear doors installed on Trans Canada Pipeline's Super-92 DC-3. . . . Trident Drilling's Lodestar, Jim Lougheed, chief pilot, has been converted to Super-92 engines. . . . The George W. Strake Super-92 DC-3 was in for installation of lightweight landing gear doors, new de-icer boots, re-covering of control surfaces and annual relicense. . . . John Briggs and Tom Anderson brought in the Holliston Mills Super-92 DC-3 for lightweight landing gear doors and annual relicense. . . . The Chemstrand Lodestar was in for a new interior, using the company's own Acrilan fabrics, and a 100-hr. inspection. Bob Hinds is chief pilot. . . . Navco, Inc., of Lambert Field, has added a new matte white dial refinishing service to its instrument overhaul shop. . . . Ralph Piper has had a dual hydraulic system installed in his Monsanto Chemical DC-3. . . . Shell Avion of Canada has just taken delivery of a new Remmert-Werner DC-3, with a combination cargo-executive configuration. John Stuart, Ross McFee, Gordon Thorne and Harry Treichel are the pilots, and all of them came down to St. Louis to pick it up. . . . Sid Stone brought in the Wayne Knitting Mills Beech E18 for inspection and installation of boots.

PACIFIC AIRMOTIVE'S MILITARY AIRCRAFT FACILITY at Chino, California, has delivered the last C-47 under the company's third C-47 IRAN (inspect and repair as necessary) contract, bringing to a record total of 630 C-47 aircraft overhauled, modified and delivered on schedule to the Air Force. As many as 32 C-47's a month were rolled out. . . . John W. Meyers, PAC president, reports consolidated sales for PAC and its subsidiaries totaling $24,467,215 for the 9-month period ended August 31, 1957, up from $14,759,926 for the same 1956 period. Indicated net profit after taxes was $557,674 down from $596,174 for the same 1956

10,000-MILE TRIP to Argentina is being made in this new 2-place Champion Tri-Traveler by Danilo Frey (right), Argentine representative for Aviquipo, Inc., export agency for Champion Aircraft, Osceola, Wisconsin. He is shown with James Boutwell, Champion distributor for southern U. S.

When Time Counts.....

YOU CAN DEPEND ON REED FOR ON-TIME DELIVERY OF YOUR AIRCRAFT

The leading business firms of the nation have relied on the J. D. REED COMPANY for over 25 years for the best in aircraft service, maintenance and overhaul.

And Here's Why—

REED'S *Maintenance and Overhaul Shop*

. . . is one of the nation's most modern and complete facilities . . . equipped to handle any job with tools designed for each specific purpose . . . and skilled know-how that comes from long specialized service on all types aircraft.

REED'S *Radio and Electronics Shop*

. . . is a miracle of efficiency with trained technicians to install and service the world's finest navigation and communication systems . . . complete testing facilities are available to check and prove equipment accuracy.

REED'S *Stock of Parts and Accessories*

. . . is maintained at levels to provide a ready availability of all parts that go into any workorder . . . parts and accessories stocked by the J. D. Reed Company are factory approved and fresh from the manufacturer.

REED'S *Engine and Propeller Shop*

. . . is staffed with specialists with an intimate knowledge of their job . . . whether the job is trouble shooting or an engine or propeller installation our detailed attention will assure safe and efficient performance of your aircraft.

With the J. D. Reed Company it's ON-TIME DELIVERY everytime. We invite you to visit our shops to see why we can better serve your aviation needs. You will find us anxious to serve you.

REED

J.D. REED CO. INC.
SALES SERVICE
Beechcraft
DISTRIBUTOR

Telephone OLive 4-4351, Municipal Airport, HOUSTON, TEXAS

PROGRESS SPANNING 26 YEARS is represented by this scene grouping a 600-mph. Boeing 707 and a 1931 single-engine Pilgrim 8-place airliner once operated by American Airways. Occasion was retirement of the Pilgrim from service with Alaska Airlines. It was purchased by the Salmon River Flying Service in Idaho. American Airlines retired the same Pilgrim in 1937 and now has 30 125-passenger Boeing 707's on order. Boeing made the photo at Seattle.

period. Lower earnings were blamed on losses from one large military contract for which government adjustments will be sought.

AEROTHERM CORP., Greenwich, Conn., has received a purchase order from Pan American World Airways for all of its Boeing 707 passenger seats. New models will be produced for all requirements, first class and tourist. Special design emphasis is being placed on safety features in accordance with Aviation Crash Injury Research and NACA recommendations, a field in which Aerotherm has done considerable pioneering work. Deliveries will start at the end of this year.

HERTZ RENT-A-CAR SYSTEM now has rental cars in Dallas equipped with two-way radios — first time this service has been offered by a car rental company. A transmitter has been installed in the Love Field terminal, where the operator relays messages to and from the drivers. If the system proves popular, cars in other cities will be similarly equipped.

AIRCRAFT RADIO CORP., Boonton, N. J., has named George J. Torpey of Morristown, N. J., to its flying ARC radio sales staff. He will fly ARC aircraft throughout the U. S. introducing and demonstrating ARC's growing list of commercial radio and navigation aids to the expanding market of private and executive aircratf.

ROLLS-ROYCE DART TURBOPROP approved overhaul periods have reached 1,400 hours for the Model 506 engines used on British European Airways Viscount 700's only four years after entering service. Further trials are under way with a goal of 1,500 hours.

SOUTHWEST AIRMOTIVE OF DALLAS has received the first repair station certificate ever granted by the Civil Aeronautics Administration for the overhaul of commercial jet engines. Air Agency Certificate No. 195, just received after review and renewal, includes ratings for the overhaul of the Allison 400-C4 turbine engine and Allison and Pesco pumps, Bendix and Rochester fuel controls, Detroit Diesel fuel nozzles, Allison fuel manifolds, Scintilla ignitors, Scintilla HiTen ignition harnesses, Parker and Kohler valves and Air Mase filters.

AERO CORPORATION OF ATLANTA, Atlanta Municipal Airport, is taking on more and more military work, while CAA supplemental type certificate (STC) requirements and delays make executive aircraft modifications more uncertain than ever. The company says it is very difficult to quote with any accuracy on modification costs and down-time — due to uncertainties and delays involved in CAA handling of STC applications. Consequently Aero is taking on more military projects, even though it is primarily a modification and service facility for business flying. . . . Newest contract calls for maintenance of electronic equipment, both ground and air, for Redstone Arsenal, Huntsville, Alabama. . . . About 30 engine changes on military aircraft are being made. A large quantity of L-19 aircraft is being dismantled and crated for overseas shipment in the foreign aid program. . . . A contract has been received for the overhaul of helicopter clutches. . . . The engine shop, busy on a large helicopter engine overhaul contract, is now turning out 2 engine overhauls daily and is still being expanded with additional machinery. . . . An X-ray inspection was performed on the Rick Reaves Super 18 Beech from Rockford, Illinois. Pictures on these inspections are now processed on the spot and the airplane leaves with its pictures. . . . An engine change and 100-hr. inspection were performed on John J. Hart's Aero Commander.

FIRST GE COMPASS SYSTEM delivered by Wilcox Electric is shown going to Arthur W. Templeton (left) of Southern Airways. Handing it over is Orin (Moose) Redhead, Wilcox corporate aircraft sales executive. Delivery was made during the NBAA meeting in Denver last month. Wilcox is distributor for the low-cost, lightweight, gyro-stabilized General Electric Compass System.

CONVAIR 340-440 WINGTIP JET CONVERSIONS have been described by J. G. Zevely, Convair director of commercial sales and contracts, as being competitive with current turboprop transports. Cost of the conversion kit, including two jet engines but not including installation labor, is estimated at about $150,000. Two types of engines are offered — the Fairchild FT-101E (a version of the J44) and the Continental 352-2 (based on the J69). The kit incorporates all necessary wing reinforcements, extension of fuel tanks and control panel additions. Convair estimates about 4,500 man hours required per conversion, based on a fleet minimum of six aircraft. The jet-equipped 440's block speed would go to 257 mph. on a 500-mile flight with a full payload of 12.920 lbs. (52 passengers, 4,600 lbs. of cargo), compared to 234 mph. for the conventional 440. On a 1,200-mile trip, the jet block-to-block speed would rise to 292 mph. as against 256 mph. Gross take-off weight would be increased more than 4,000 lbs. but the 440 was built for a structural design take-off weight of 53,200 lbs. to take advantage of additional engine power when it became available. Tip jet conversion will reduce critical take-off runway length by 20 per cent and considerably improve the rate of climb. These factors mean higher payloads from high altitude airports and in hot weather.

CABIN PRESSURIZATION EQUIPMENT on the newly-developed On Mark Model 450 14-passenger, 420-mph. executive transport will provide sea-level cabin comfort while flying at 20,000 ft., according to AiResearch Manufacturing Division

(Continued on page 64)

Lodestars are a specialty at Minnesota Airmotive, Minneapolis. It has converted many of them and has a Super Lodestar project of its own.

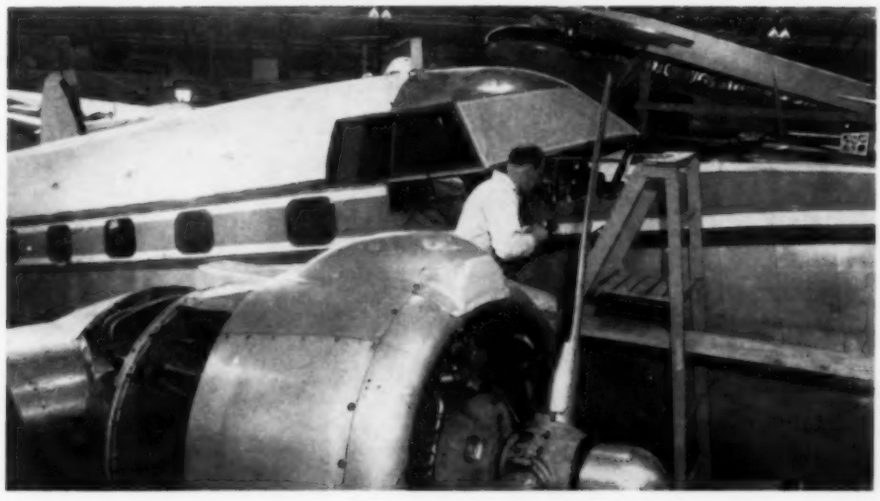
Major Facility At Minneapolis

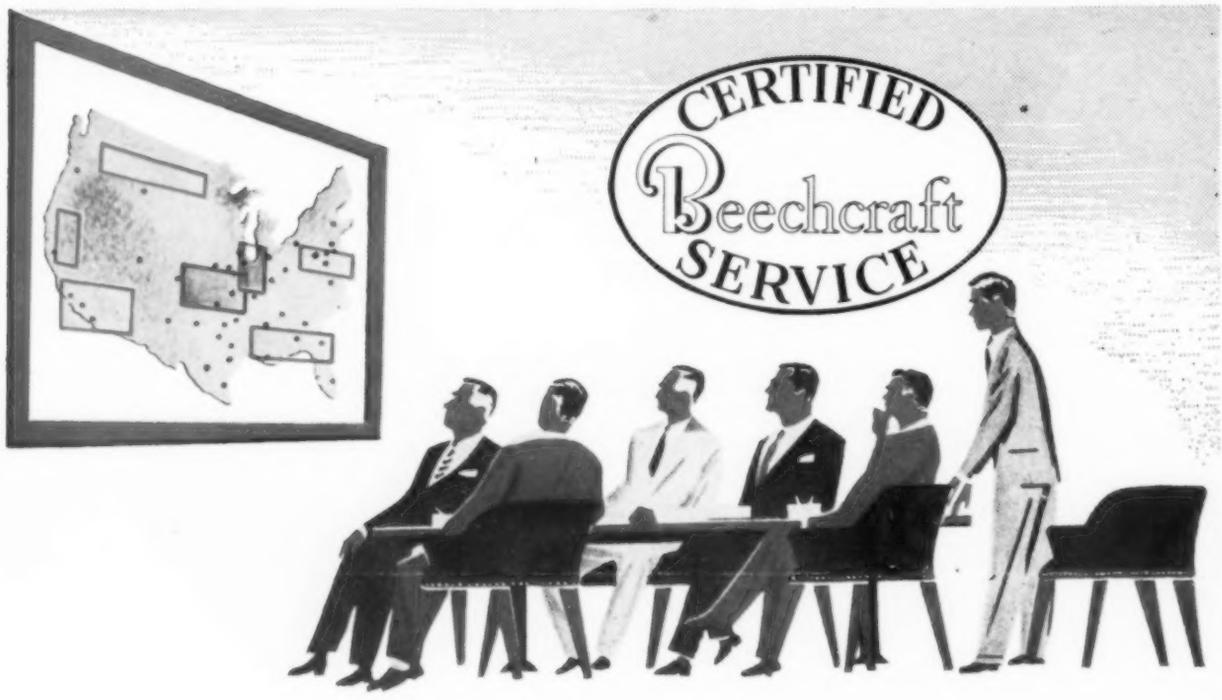
ONE of business flying's most completely-equipped modern conversion and service centers is operated by Minnesota Airmotive on Wold Chamberlain Field in Minneapolis. Its huge 243 by 188-ft. hangar facilities have elaborate shops for all types of work, being a CAA-approved station for airframe, engines, propellers, instruments, accessories, radio, radar and DME.

Minnesota Airmotive is also a sales center, being distributor for Aero Commander, Lycoming, Collins, Bendix Aviation, ARC, Champion Spark Plugs, Dare Radio, Hartzell, Kollsman, Lear. Flite-Tronics, Pioneer, RCA, Sperry, B. F. Goodrich, Pesco, Texaco and others.

Wayne Cronje is general manager, sales and development; Ralph Peebles is general manager, operations; Jerry Koons is sales manager; Jim Roach is superintendent of maintenance and Sid Setterlund is chief engineer. Phil Stomberg heads radio and electronics; Cecil Wey heads propeller and accessory overhaul; Jim Karnowski heads instrument overhaul; Steve Cooper is purchasing agent and Earl Joul heads line service. J. B. (Bud) Fisher is in charge of aircraft sales.

Complete modification and rebuilding services include DC-3 and Lodestar work. Below is a Minnesota Airmotive landing gear door installation, while worker at right below is installing a Lodestar wrap-around windshield.





keep your Executive Team at full strength

The "Executive Teams" of thousands of firms are strengthened by the rugged dependability of their Beechcrafts. The day in-day-out performance of these aircraft allow more executive time for urgent business . . . time for important conferences in far-away places . . . more time to explore new fields . . . more time for pleasure and relaxation.

We can help keep your team at full strength by insuring against loss of executive time by out-of-service aircraft. Servicing and maintenance of the "Business Fleet" is a specialty of our factory trained service staff. Let us check your airplane today . . . We will also be glad to explain our regular maintenance plan for greater safety — lower costs.

AIRCRAFTSMEN, INC.
Will Rogers Field
Oklahoma City, Oklahoma

ALAMO AVIATION, INC.
Municipal Airport
San Antonio, Texas

ANDERSON AIR ACTIVITIES
General Mitchell Field, Milwaukee, Wisc.

ATLANTIC AVIATION CORP.
- Teterboro Airport
  Teterboro, New Jersey
- Logan International Airport
  East Boston, Massachusetts
- International Airport
  Philadelphia, Pennsylvania
- New Castle County Airport
  Wilmington, Delaware

BUTLER CO., AVIATION DIVISION
Municipal Airport, Chicago, Ill.

CURREY SANDERS AIRCRAFT CO., INC.
Downtown Municipal Airport, Shreveport, La.

CUTTER-CARR FLYING SERVICE INC.
West Mesa Airport, Albuquerque, New Mexico

GRAY AIRCRAFT SVC. CO., INC.
D. A. Cody, Service Manager
Love Field, Dallas, Texas

ELLIOTT FLYING SERVICE
Municipal Airport, Davenport, Iowa

LOPEZ GRACE AVIATION, INC.
Building No. 3 and No. 18
Broward County International Airport
Fort Lauderdale, Florida

THE NORMAN LARSON CO.
PLANESERVICE, INC. (Service Division)
Van Nuys Airport, Van Nuys, Calif.
(Los Angeles Area)

J. D. REED CO., INC.
Municipal Airport, Houston, Texas

ROSCOE TURNER AERONAUTICAL CORP.
Municipal Airport, Indianapolis, Ind.

TEXAS AVIATION CORPORATION
G. K. Roberts, Pounds Field
Tyler, Texas

TOPEKA AIRCRAFT SALES & SERVICE
Municipal Airport, Topeka, Kansas

TRADEWIND AIRPORT CORP.
Tradewind Airport, Amarillo, Texas

TULSAIR DISTRIBUTORS, INC.
Hangar 8, Municipal Airport, Tulsa, Oklahoma

UNITED AIRPLANE SALES, INC.
New Municipal Airport
Wichita, Kansas

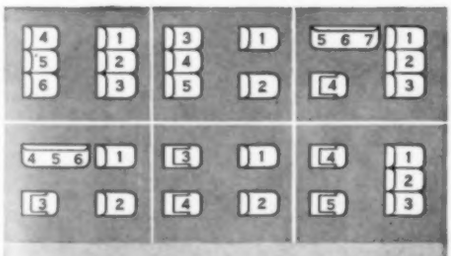
Put Your BEECHCRAFT in BEECHCRAFT Hands

EASY WAY TO LAND A CONTRACT

SALES CURVES SOAR WITH 240 mph. TWIN-BONANZA TRAVEL

Sales problems have a way of disappearing for the man who gets there first. With Beechcraft's six-place Twin-Bonanza, you don't wait for reservations — you go **where** you want to go **when** you want to go — fly non-stop as far as 1,650 miles at speeds up to 240 miles per hour, see more prospects . . . make more sales.

The Twin-Bonanza offers more points of superiority than any other airplane in its field! It delivers more power, has a higher recommended cruising speed, carries more payload, has greater range, gives better performance, is more quiet, has better visibility, compiles a better safety record, comes more fully equipped, has more comfort features, adapts better to your individual needs, and has a higher resale value!



choose from six beautifully styled seating arrangements

Twin-Bonanza interiors provide luxurious, quiet, and pleasant relaxation.

Your Beechcraft distributor or dealer will be happy to demonstrate the Twin-Bonanza and to explain the finest leasing and financing plans in aviation, or write to Beech Aircraft Corporation, Wichita 1, Kansas, U. S. A.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

HANGAR BUSINESS

(Continued from page 60)

of the Garrett Corp., which will furnish the equipment. It is similar to that designed for the Boeing 707. At 30,000 ft., the cabin level will be 5,000 ft. The new On Mark is scheduled to begin its flight test program next summer.

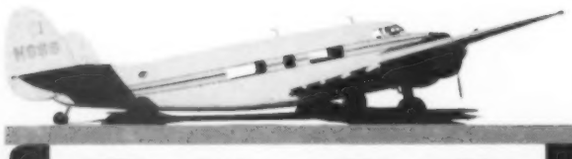
THIRTEEN EXECUTIVE VISCOUNTS have been sold and most of them delivered, according to Dave Sykes, Vickers representative in the U. S. The four-engine turboprop transports in executive flying include the following: One for Howard Hughes, three for U. S. Steel, one for Standard Oil of California, two for the president of Brazil, one for the Greek shipping magnate, Onassis, one for the Pakistan governor general, two for the prime minister and president of India, one for the government of South Africa and one for the Department of Transport in Canada.

HEAVY RELEASES OF SURPLUS MILITARY AIRCRAFT are planned between now and July, 1958, the Air Force having listed 1,505 surplus planes of different types for sale during the period. They will include 286 North American B-25's, 104 Beechcraft C-45G's, 615 Douglas B-26's; 116 Curtiss C-46A/D's, 38 Ryan L-17 Navions, 162 North American single-engine T-28A's, 84 North American T-6G's and 100 North American F-51's. First sale will be on November 22 at McClellan Air Force Base, Sacramento (12 B-26's, 20 F-51's and 12 T-6G's). On a December date to be announced, the second sale will be at Norton Air Force Base, San Bernadino (24 T-6G's, 20 T-28A's, 20 C-45G's, 4 C-46A/D's, 10 B-25's, 13 B-26's and 17 F-51's). The Air Force announcement said locations and dates for other sales will be made by bases concerned. Additional information about the McClellan and Norton sales is available by contacting the Property Disposal Officer at the Air Force Base conducting the sale. Headquarters, Air Materiel Command, Wright-Patterson Air Force Base, Ohio, released the general announcement.

FIRST PAGAN VERSION of the Beech 18, modernized by Cair, Chamberlain Aviation, Akron, was delivered recently by Jack W. Hale (right) to Marshall McDowell, pilot for Gerstenslager Co., truck body manufacturer. Pagan modification, which increases Beech 18 useful load about 900 lbs. over standard D models, includes removal of nose tank; wing tank installation; power plant refinements; new nose section of fiber glass, tail gear door, modern wing tips, air-step door and re-designed cabin interior.

—(Chamberlain Aviation Photo.)

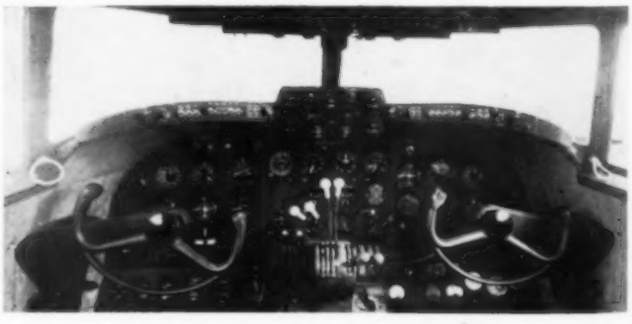
AN ACCELERATED 1,000-HOUR FLIGHT PROGRAM was launched last month by Allison for simulated airline operation on a Convair YC-131C powered by the same Allison propjet power package to be used on the Lockheed Electra airliner. E. B. Newill, Allison general manager, said part of the program, known as "Operation Hourglass," will be to demonstrate the economical possibilities of converting existing aircraft to propjet power. "Commercial operation of turbine engines immediately will obsolete piston engines for transport operation," he said, claiming higher speed, greater load carrying and economical consumption of lower-cost fuel as advantages.



for sale *to a discriminating owner*

This deluxe Lockheed Lodestar, modified and converted with all the skill and experience of our Executive Aircraftsmen, is for sale. It features superb accommodations for nine passengers and crew and many outstanding engineering accomplishments. For complete details and cost, contact L. V. Emery, president.

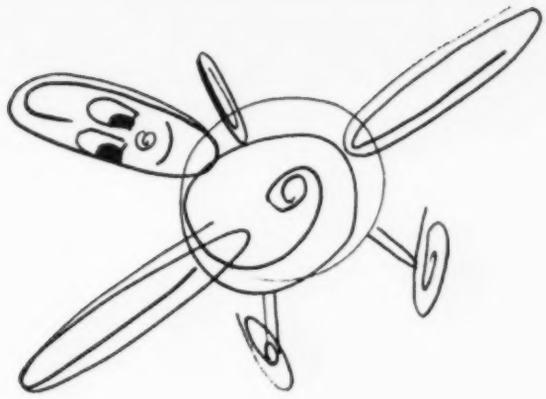
Financing and lease plans available.



EXECUTIVE AIRCRAFT SERVICE, inc.

Garland Airport • P. O. Box 7307 • Dallas, Texas • Telephone: DAvis 1-2675

look what's here



A New Accident Insurance Policy For the National Pilots Association

Chalk up another big reason for belonging to the National Pilots Association — a special low-rate accident insurance policy available only to NPA members. It's insurance every pilot should have at a rate every pilot can afford. And it's made possible through NPA's steady campaign to provide better flying for all types of pilots.

NPA makes no profit from its insurance, just as it makes no profit from the many advantages enjoyed by its members. For the National Pilots Association is a non-profit body governed by pilots for pilots. Its main purpose is to promote the welfare of pilots.

All NPA members enjoy a voice in NPA affairs — in shaping the aviation future of America. NPA is their outfit — *your* outfit.

Send your membership application *now* and become a part of this important organization.

Complete the membership application below, or mail NPA a postcard and we will send details of the insurance plan.

CHECK THIS

- √ NPAers receive a regular news bulletin from Washington keeping them up to date on all decisions affecting aviation.
- √ NPAers attend an annual two day meeting to hear leading figures from the aviation industry and government agencies.
- √ NPAers can get personal help from their national headquarters on any problem they may meet in flying or plane ownership.
- √ NPAers are sure their ideas reach receptive ears because they are NPA and their directors look after the interest of pilots only.
- √ NPAers have a say in selecting the outstanding aviator of the year. The 1957 award went to Bernt Balchen.

NATIONAL PILOTS ASSOCIATION
501 Fifth Avenue, New York 17, N. Y.

In accordance with the By-Laws of National Pilots Association, I hereby apply for a Membership and enclose my check for $10.00 to cover first-year dues.

My CAA Ctf. # is: ..... Class: .....
(ATR, Comm'l, Pvt., Student)

Ratings. .....

I fly a ..... Owned by .....
(Make and Model Airplane)

I soloed ..... 19 .... Approx. time to date: ..... hours.

(Please type) Name .....

Street .....

City ..... Zone ..... State .....

Date ..... Signature: .....

NATIONAL PILOTS ASSOCIATION

501 Fifth Avenue — New York 17, New York

For worldwide communications

TRANSVAL
MARK IV

6 channel 2-10 MC transmitter-receiver

The self-contained power supply transmitter-receiver unit is connected by a single electrical cable to the cockpit remote control.

35-watts in 14-pounds

Never before has a transmitter-receiver of comparable power and range been available in such a small, light-weight package. Transistor application with Transval's new concepts in circuitry and design, result in dependable two-way communications that far exceed the average range of today's planes.

Automatic Antenna Loading Coil...

...for operators preferring fixed antenna rather than trailing, yet who must have long range on all frequencies between 2 and 10 mc.
5 pounds, 12 x 5½ x 7 inches.

Transistorized Circuitry

Transval engineers are pioneers in the application of transistors to communication and power supply equipment. Their developments are years ahead, resulting in lower weight, smaller size and more dependable operation. Newest accomplishment is a line of transistorized inverters and converters to replace dynamotors and vibrator power supplies.

Cabin-Isolation Amplifier

Weighing less than 3½ pounds, Transval transistorized cabin amplifiers provide the audio amplification necessary for multiple speaker operation in transport, and business aircraft. Small (3 x 7 x 3 inches) compact and ruggedly dependable. Operates on 14 or 28 volts.

Write or phone today:

TRANSVAL
Engineering Corporation
10401 West Jefferson Boulevard
Culver City, California · VErmont 9-2301

NEW TWO-SEATERS

(Continued from page 16)

justable fore and aft and up and down — to take care of the shorties as well as the beanpoles — and students come in all assorted sizes. Tandem seating is more comfortable than side-by-side seating—it gives plenty of width for fat or skinny people, plenty of elbow and arm room. I don't think an instructor should fly in the student's lap, so to speak, because the student is confused enough as it is. By himself with the instructor in the other seat, the student feels more on his own and will go ahead and use more initiative, instead of depending on the instructor to suggest or monitor every move, every action and reaction. I also think a student flies a more balanced pattern in his maneuvers when he is in a tandem — in a side-by-side cockpit, his turns will vary in radius, depending upon the side of the airplane he flies from.

But the big design feature should be a nose-wheel landing gear. This makes taxiing more routine for a beginner. It gives him more visibility. It gives him more positive control in the take-off run. In the air, there's no difference. But the pay-off comes in the landing. Instead of wrestling with himself to learn all of the fine points in the technique of nose position in a three-point landing, the student should be able to fly the airplane right on down to the landing. The major reason for this is the fact that he should be able to retain control at all times in the approach and landing. In a stalled landing, control is lost as speed is lost — the slower the speed, the less control. Remember, we're speaking here of primary students — not pilots. Experienced airmen need never lose control in a tail-wheel landing, but beginners do. It is frustrating to them. It can discourage them from completing their instructions. Even after they advance to cross-country hops, this tail-wheel bugaboo haunts the student when he comes in on unfamiliar fields and cross-wind. A modern nose-wheel gear would eliminate every bit of this. Landing should actually be no more difficult than driving an auto up to a traffic light and stopping. I'd say the ease of handling a nose-gear trainer in a demonstration to a prospective student will increase our number of active students at least 50%.

This discussion could be extended on into many facets of student instruction. But it would all add up to the same thing — aviation needs a modern little tricycle trainer.

We have no idea what it would have to sell for. The standard 1958

FOR YOUR OWN PROTECTION . . .
. . . . . Shield yourself against avionic problems.
Use FAULKNER AIR RADIO for any and all
avionic needs . . . . . .
Faulkner
FAR
Air Radio
INTERNATIONAL AIRPORT
HOUSTON, TEX.

Piper Cub, with 90-hp. engine, now sells for $5,695. I don't believe anybody can build a simple trainer any cheaper than Piper can build this airplane, although the 65-hp. engine should cost a little less.

Maybe this new tricycle trainer ought to be made available also in kit form. Flying clubs and operators desiring to hold costs down to rock bottom could then buy the components in boxes and assemble their own.

Speaking of Piper, let us not forget that he now has Fred Weick working in research and development, a new division for the Piper company. I mention this because I believe that Fred Weick designed and built one of the finest little airplanes in aviation when he turned out the Ercoupe. This was not a cheap airplane originally and would not be a cheap one today if Piper began producing something similar to it. But it was a wonderful airplane because it had tricycle gear. I personally didn't like the way it had to be yanked off the ground, however — it was either flying or not flying, in the take-off, there being little or no transition speed in it. This can be easily cured if somebody comes out with something similar. I refuse to become involved in an argument over 2-control versus 3-control, although I prefer 3-control. This is totally beside the point. The tricycle gear is the important thing.

Be it said that I am not recommending we make flight instruction any easier for students. On the contrary, I think existing standards of instruction should be improved. For example, I believe familiarization with spins should be required. I think more knowledge of weather should be stressed. While I know as well as anybody does that the poor flight instructor always was, still is and always will be underpaid, I believe he should have higher standards than he now has. He should never turn loose a student he isn't 100% positive about. He should never gloss over errors. An instructor isn't worth the powder it'd take to blow him apart unless he can turn out fully-qualified students, each of them capable of passing the CAA with flying colors and with sufficient confidence in their ability to be proud of it. After all, any student falling below this average isn't worth anything to himself, to aviation or to anybody else — he won't get very far. But a fully qualified student will be a safe and happy flier, interested enough in flying to find some means of continuing his use of airplanes, and interested enough in aviation to put up with the kicking around he will encounter in his early career.

The New

ALLIED "TILT-A-PANEL"

- Manufactured from durable aluminum
- Engraved letters filled with color 65 flouresecent paint.
- All holes milled to instrument specifications.

- 15-degree tilt on lower instrument row.
- All warning lights of the miniature "press-to-test" type.
- Finish as specified by customer.

The Allied "Tilt-A-Panel" manufactured by Allied Instrument Laboratories is designed to replace existing instrument panels in Aero Commanders from the 520 through the 680 series as currently manufactured.

This custom engineered new panel provides more legible panel space as required in today's highly instrumentated aircraft. It can be supplied as a package unit ready to install, even including "eyebrow" or pencil lighting as desired by the customer.

The customer is furnished a full size drawing of the panel in order that he may group the instruments as desired. All panels shipped are completely finished and include filled engraving as needed.

As panel requires no fitting to the aircraft, the customer may continue to use the plane and install the new panel at the most convenient time and place.

Write today for complete details on the wonderful new Allied Instrument Laboratories "Tilt-A-Panel."

ALLIED INSTRUMENT LABORATORIES

AIRCRAFT RADIO COMPANY COMMUNICATIGNS

SALES • SERVICE
Phone OLive 4-5738
8238 Travelair, Municipal Airport
HOUSTON 17, TEXAS

AIRCRAFT INSTRUMENTS AIRBORNE ELECTRONICS

AT ASSOCIATED RADIO

We Deliver

When others promise

Pilots and planes differ in equipment needs — no "standard" aircraft radio installation can serve everybody efficiently.

Custom avionics at ASSOCIATED RADIO is the practical solution to specialized needs — we have the right answer with expert engineering, design, performance and servicing.

There's something new and useful to you in everything we do and we have the latest developments in our large stock of Sperry, Collins, RCA, ARC, Dare, McMillan, Comco, Flite-Tronics, Sun-Air and Electro-Voice equipment.

If yours is a special problem, bring it to ASSOCIATED RADIO for satisfaction.

ASSOCIATED RADIO CO.
CUSTOM DESIGN
LOVE FIELD
DALLAS

FLeetwood 7-2891
We are CAA Repair Station No. 3664, Radio Class 1, 2, DME and Limited Radar.

DAWN TO DUSK

Holder of highest awards for aerial war service and Pulitzer race winner in 1922, Col. Russell L. Maughan, after two prior attempts, piloted a Curtis pursuit plane from New York to San Francisco on June 23, 1924, completing the first dawn to dusk flight across the continent.

This was another step in the early progress of aviation, each of which contributed its share to the rapidly growing industry.

This rapid growth also led to the need for financial stabilization in the form of aviation insurance which was pioneered in 1928 by the United States Aircraft Insurance Group. This same "U. S. Group", now comprised of over 60 leading companies, has continually and dependably served the aviation market for over a quarter century.

For your aviation needs, be sure you have the lasting security of a "U. S. Group" policy. Coverage is conveniently arranged through your own agent or broker.

UNITED STATES AVIATION UNDERWRITERS
INCORPORATED
80 JOHN ST. • NEW YORK 38, N. Y.

ANDRAU AIRPARK, INC.

- 24 HOUR OPERATION
- 2 LIGHTED RUNWAYS — 4714'
- 80-90-100 OCTANE GASOLINE
- LOW FREQ. HOMING BEACON 269 kc AAP
- COMPLETE MAINTENANCE SERVICE
- RESTAURANT
- 15 MILES DUE WEST OF HOUSTON
- AVIS RENT CARS ON FIELD
- CANAL FOR SMALL SEAPLANES — RUNS EAST-WEST

HELENE B. WOLFF
Owner & Mgr.

Andrau AIR PARK
HOUSTON

JUST AMONG OURSELVES

(Continued from page 19)

ject crude or even the handiwork of a crude science. It symbolizes extraordinary success in many efforts, such as metallurgy, fuels and combustion, aerodynamics, mathematics and relativity, computers, electronics, radio, physics, chemistry, ceramics, upper atmosphere research, aero medicine, control mechanisms, optics and on and on. Even more sceientific breakthroughs can be expected from Sputnik II and future satellites.

As an omen overhead, Sputnik can not be ignored nor underestimated as many government officials from Ike on down have attempted to do. It is an omen of destruction, for the Communists have never hidden their intentions of destroying the American way of life.

Much more than a hurtling sphere of metal transmitting beep-beeps is this Russian device. It represents a guide to the thinking and preparations behind it. It must be countered by positive leadership capable of preparing the United States to meet the challenge. Washington vacillation in this atmosphere is criminal. This country needs leaders who have the courage of their convictions and will stand up and be counted when decisions are made, regardless of voting sentiment. Trying to please everybody won't save the nation from a determined enemy.

Our survival poses enormous demands, not only upon our leadership but upon our standards of living. Courage to sacrifice political expediency is only a beginning. The sooner this first positive step is taken, the better off all will be. But from what has come out of Washington thus far, even this small concession to reality seems too much to expect from weak and confused leadership.

You ask, Virginia, what every American is asking, "What can we do, what must we do, in the face of this threat?"

Fortunately the Congress of the United States is still very much in the driver's seat and can bail us out if the right leadership comes forward. Congress can rectify some of the mistakes of recent years by spending for defense on the basis of need rather than on the basis of what the budget people say we can afford. Congress can knock the heads of our defense department brass together and force unification of purpose instead of triplification. Congress can change our laws so the freedom-loving people of the Western World can pool their best brains and coordinate their defense efforts in order to regain supremacy — the only real deterrent to all-out war. Congress has the power to crack down on the vested interests and see that the American people get a dollar's worth of defense for every dollar expended.

So there is hope for us, Virginia. We must provide educational advantages for our students coming along. Here is one area where we can especially shine as an industry if instead we'll spend just half the time and money we poop off on propaganda, self-interest societies and fancy parties on some educational advantages for our young folks seeking openings in scientific fields. More and more aviation industry leaders are beginning to see the light in this direction.

Finally, we can pray for some real national leadership and statesmen to come along as they have in times of crisis throughout our colorful history.

GRUMMAN GULFSTREAM

(Continued from page 33)

of 8,800 lbs. An auxiliary supply of about 178 gals. weighing 1,200 lbs. will be available.

It is interesting to go over Grumman's design figures for the Gulfstream. In the weights, for example, realistic allowances are provided for equipment and furnishings. These total 2,748 lbs. — as compared to 2,520 lbs. for passengers and baggage. Allowances are generous — 570 lbs. for communications and navigation

navigate!
communicate!
cogitate!

WHILE YOUR GLOBE AUTOPILOT FLIES

and 160 lbs. for autopilot, for example; 143 lbs. for food, liquids, magazines and the like for passengers; 480 lbs. for 12 passenger seats at 40 lbs. each; 208 lbs. for trim, curtains and floor covering and 170 lbs. for lavatory, galley, cabinets and even the wash water for the lavatory.

Payload means exactly that — 12 passengers at 170 lbs. each plus baggage at 40 lbs. each for a total of 2,520 lbs.

Operating items (2 crew, unuseable fuel, oil, 13 gals. of fluid for water injection and crew baggage for a 651-lb. total) and furnishings and equipment as detailed above are included in the basic operating weight, which is 19,680 lbs. as compared to a 16,932-lb. bare weight empty. With payload added to the basic operating weight, the zero fuel gross weight is 22,200 lbs., to which 8,800 lbs. for fuel are added to arrive at the 31,000-lb take-off gross weight.

Inside, the cabin is 32 ft. 8 ins. long and 73 ins. high. This compares favorably with the dimensions of the DC-3 to provide spaciousness. Interior cabin width is not stated but appears to exceed that of the DC-3 — the fuselage is circular with floor width appearing to be greater than the 73-in. height. Ten cabin windows are 17.5 by 25.5 ins. each, elliptical in shape.

The Grumman will have a self-contained stair door forward of the propeller arc. An auxiliary power unit permits ground operation of cabin air conditioning equipment, radio, lights and other services independent of the main engines.

Grumman amphibians are familiar in corporate flying, the latest being the Mallard. However, Grumman ceased commercial aircraft activities during the Korean War and is only now re-entering the market. It has had the 159 under consideration for some time. To help guide its design decisions, the company used a market survey conducted as an anonymous research by Viemeister Associates, Inc., of Lindenhurst, New York. Detailed questionnaires were forwarded to 278 operators of heavy twin-engine executive aircraft — Lodestars, DC-3's and the like. Replies came from 124 of them, operating 241 airplanes of which 60 were DC-3's, 45 Lockheeds and 59 Beech Twins. Here are the results of that survey:

	Range of Answers	Mean
Annual Utilization, hrs.	250- 1,000	596
No. Psgrs. per Trip	——	4.03
Trip Length, mi.	50- 2,400	628
Typical Cr. Spd., mph.	180-300	——
Typical Alt., ft.	4,000-15,000	7,900
Pct. Trips IFR, %	5-95	42.4
Typical Fuel Res., %	10-65	21.9
Home Runway, ft.	3,000-12,500	5,880
Smallest Runway Visited ft.	1,500- 4,500	3,230

Using the replies, Grumman was able to plot desired cruising speed as being 300 mph. or more, desired seating as being 8-11 passengers, desired cruising range as 1,800 mi. or more and desired runway length as 3,000-4,000 ft.

The Gulfstream was designed to meet or exceed these requirements and it appears that Grumman estimates of the potential demand, while not specified, are sufficient to justify the investment in putting the new design into production without government orders.

Yes - "PRECISION" has A FULL HOUSE

Everything from the Firewall Forward

Aircraft Engines
Aircraft Propellers
Aircraft Accessories
Kustomer Sales
Kustomer Service

Precision Aeromotive Corporation

International Airport Houston, Texas Phone Mission 5-6636

just 15 steps...

from your car to the elevator!

Come as you are, and drive right in! Register, get in a private elevator and — presto — you're in your room. It's only 15 steps from car to elevator at The Adolphus ...In the meantime your car is parked in our *Connecting Garage*. Next time, stay at The Adolphus.

in Dallas.. HOTEL Adolphus

20-Channel

GLIDE SLOPE RECEIVER

With Transistor Power Supply

Light, Compact: Weighs only 7.8 pounds including power supply. Fits short ¼ ATR rack.

Transistor Power Supply: No vibrators, no dynamotors. Two transistors supply the power. Requires only 1.15 amperes at 27.5 volts, or 2.3 amperes at 13.75 volts.

20-Channel Remote Control: Supplied with 10 crystals with provision for later addition of 10 more. Electric remote control selection of channels with DARE CG-20 control or any standard Glide Slope Control. Frequency range 329.3 to 335.0 mc.

Highly Stable Circuit: Extremely small course width variation and reliable on-course stability. Uses all ruggedized tubes and long life transistors.

Operates Up to 3 Indicators At One Time: Ideal for single engine or multi-engine aircraft. Can be used with any standard Glide Slope Indicator.

MEETS CAA-TSO-C34 REQUIREMENTS

DARE INC.

U. S. ROUTE 25, TROY, OHIO

WHAT ?? WHERE HOW MUCH $

IFR HOOD

First in Safety! First in Comfort!
First in Pilot's Choice

The modern method of simulated instrument flight for training and maintaining proficiency.

$15.00 at your Airport or

FRANCIS AVIATION

Box 299 Lansing, Michigan

Arizona's Airport
TUCSON

SALE OR LEASE

ROYAL GULL AMPHIBIAN
EXECUTIVE de HAVILLAND DOVE
EXECUTIVE LOCKHEED LODESTAR
GRUMMAN SUPER WIDGEON

TIMMINS AVIATION LIMITED
Montreal Airport
TAL

Pompano Beach Airport

Quickest, Easiest Access to all points between Palm Beach-Miami

Complete Business Aircraft Services

No Landing Fees 24 Hr. Line Service
No Traffic 80-91-100 Octane

Four 4000' x 150' hard surface runways
122.8 Unicom — Night Lighting

On the Airport

Golf—18 hole course
Clubhouse, lounge
Restaurant
Swimming Pool
Showers and lockers
Car rental

Next to Airport

Excellent accommodations
Hillsboro Lighthouse
Deep sea fishing
Yacht Basins
Ocean Beaches
Amphibian charter

50 beautiful mechanics
All facilities for airframe, engine, radio, electronic maintenance, conversion, overhaul

by

Remmert-Werner
of Florida, Inc.

World Records Holder

(Multi-engine Distance-Altitude)

Woman pilot, 26, available for temporary or permanent flying assignments, 5100 hours, fully qualified all types, including DC-3 and B-17, experienced international flying.

Miss Jerrie Cobb
2 Janssen Place Kansas City, Mo.

NAVCO Inc.

Lambert Field
St. Louis, Mo.
PErshing 1-1710

$1,000,000 in Active Parts for Executive Aircraft

Douglas	Airframe Parts	Pratt & Whitney
Beechcraft	Engine Parts	Continental
Lockheed	Standard Parts	Wright
A.R.C.	Sperry	Accessories
Bendix	R.C.A.	Instruments
Collins	Wilcox	De-icers, Tires

AIREX Service

---

at YOUR command...

master craftsmen who bring to life the unmatched excellence of Charles Butler designed interiors.

EXECUTIVE AIRCRAFT • Quick, satisfying results in buying or selling executive planes from large multi-engine thru Bonanzas.

Phone, wire or air mail
BILL BUCHANAN
MElrose 7-1102
JOHNSON AIR INTEREST
Racine, Wisconsin

L.B. Smith AIRCRAFT CORPORATION

International Airport • Miami, Fla.

Executive Transport Aircraft

All Models — New and Used
We can save you time and money
Sales — Procurement — Trades
Leases — Finances

Welsch Aviation Company
60 East 42nd Street, Suite 729
New York 17, New York, MUrray Hill 7-5884

DeHavilland Dove

5-A Series: Nine (9) passenger airline seating; New interior — new exterior paint; All weather radio — dual flight instruments; Surface and prop de-icing; Low time engines (320-30); All bulletins complied with; Excellent condition; Airplane presently in service in Northeast; Asking $63,000.00.
Flight Magazine P. O. Box 750, Dept. T, Dallas 21, Texas

NON-BREAKABLE TETRALITE®
SPARK PLUG TERMINAL SLEEVES
FOR THREADED OR STANDARD LEADS
J. E. MENAUGH COMPANY
549 WASHINGTON BLVD., CHICAGO 6, ILL.

CAA APPROVED

$500,000.00 CASH FOR AIRPLANES

We'll spend this each month for clean light twins and single engine or complete dealers stocks new or used.
We pick up — no red tape.

VEST AIRCRAFT CO.

EMpire 6-2663

Box 5306 Denver 17, Colo.

Immediate Delivery

We stock, overhaul, and install

PRATT & WHITNEY	WRIGHT
R1830	**R1820**
—75, —92, —94	—202, —56, —72
R985	**R1340**

Lycoming — Continental
and our most popular DC-3 engine
Super-92

ENGINE WORKS
Lambert Field INC. St. Louis, Mo.

Come Visit Our New Hangar

Pompano Beach, Florida,

Airport by Hillsboro Lighthouse

No Landing Fee No Traffic

—furnishing full maintenance, conversion, inspection and overhauls for private business operated DC-3, C47, Lodestar, and D18S, with complete installation and service of radar, radio, autopilots, electronics, etc. 24 hour line service, SHELL 80, 91 and 100 octane gasoline. Extensive recreational facilities on and next to airport—swimming, fishing, golfing, boating, restaurant, showers, etc.

Executive Aircraft for Immediate Delivery—See them at Pompano Beach

Deluxe Super 92 DC-3

New ship guarantee on airframe, 800-hour guarantee on engines. Completely disassembled and rebuilt. Luxurious interior, with all large cabin and picture windows. Lightweight landing gear doors, Collins and Bendix executive radio, many extras. Today's fastest and quietest DC-3, 210 miles per hour.

Aero Commander

Trade in on DC-3. Excellent condition. Your choice of radio complement — Sperry, Collins, etc.

C18 Beechcraft

Trade in on Custom 18. Choice of hydromatic or constant props, choice of excellent Sperry and Collins radio.

Custom 18

New ship guarantee on freshly overhauled airframe, 800-hr. guarantee on engines. Painted exterior, de-icers, radome, large cabin windows, enlarged interior, modified front bulkhead, lavatory, snack bar, special seats. Dual instrumentation, autopilot, Sperry H5 horizon and C2 gyrosyn compass, Collins 51R omni with 51V glide scope, isolation amplifier, dual speakers, many extras.

Grumman Goose

Freshly overhauled airframe, props, and engines (with crankshaft modification), new interior, new exterior paint. Lightweight, late model. Omni, VHF, ADF, etc.

Also To Your Own Order

Super 92 DC-3

Nearing completion as deluxe Super 92 DC-3 to our own specifications, but still early enough in work to incorporate some of your own custom requirements. Will have all large windows, complete disassembly and overhaul, new ship guarantee, 800-hour engine guarantee.

Grumman Gooses

Now in early stages of overhaul, ready for your own specifications. On display in Pompano Beach.

Low Time C47s

A new one each month. They are now in various stages of disassembly, overhaul, and conversion at our four conversion centers in St. Louis, Toledo, McBride, and Pompano, and can be completed with many of your own modifications, with choice of engines, radio and electronic equipment, and airframe refinement. On display in St. Louis, Toledo, and Pompano Beach.

Remmert-Werner

Inc. of **ST. LOUIS** Lambert Field

Inc. of **TOLEDO** Express Airport

Inc. of **FLORIDA** Pompano Beach

WHAT ?? | WHERE | HOW MUCH $

IFR HOOD

First in Safety! First in Comfort!
First in Pilot's Choice

The modern method of simulated instrument flight for training and maintaining proficiency.

$15.00 at your Airport or

FRANCIS AVIATION

Box 299 Lansing, Michigan

Arizona's Airport
TUCSON

SALE OR LEASE

ROYAL GULL AMPHIBIAN
EXECUTIVE de HAVILLAND DOVE
EXECUTIVE LOCKHEED LODESTAR
GRUMMAN SUPER WIDGEON

TIMMINS AVIATION LIMITED
Montreal Airport
TAL

Pompano Beach Airport

Quickest, Easiest Access to all points between Palm Beach-Miami

Complete Business Aircraft Services

No Landing Fees — 24 Hr. Line Service
No Traffic — 80-91-100 Octane

Four 4000' x 150' hard surface runways
122.8 Unicom — Night Lighting

On the Airport

Golf—18 hole course
Clubhouse, lounge
Restaurant
Swimming Pool
Showers and lockers
Car rental

Next to Airport

Excellent accommodations
Hillsboro Lighthouse
Deep sea fishing
Yacht Basins
Ocean Beaches
Amphibian charter

50 beautiful mechanics
All facilities for airframe, engine, radio, electronic maintenance, conversion, overhaul

by

Remmert-Werner
of Florida, Inc.

World Records Holder

(Multi-engine Distance-Altitude)

Woman pilot, 26, available for temporary or permanent flying assignments, 5100 hours, fully qualified all types, including DC-3 and B-17, experienced international flying.

Miss Jerrie Cobb
2 Janssen Place **Kansas City, Mo.**

NAVCO

Inc.
Lambert Field
St. Louis, Mo.
PErshing 1-1710

$1,000,000 in Active Parts for Executive Aircraft

Douglas	Airframe Parts	Pratt & Whitney
Beechcraft	Engine Parts	Continental
Lockheed	Standard Parts	Wright
A.R.C.	Sperry	Accessories
Bendix	R.C.A.	Instruments
Collins	Wilcox	De-icers, Tires

AIREX Service

---

at YOUR command...

master craftsmen who bring to life the unmatched excellence of Charles Butler designed interiors.

EXECUTIVE AIRCRAFT • Quick, satisfying results in buying or selling executive planes from large multi-engine thru Bonanzas.

Phone, wire or air mail
BILL BUCHANAN
MElrose 7-1102
JOHNSON AIR INTEREST
Racine, Wisconsin

Executive Transport Aircraft

All Models — New and Used
We can save you time and money
Sales — Procurement — Trades
Leases — Finances

Welsch Aviation Company
60 East 42nd Street, Suite 729
New York 17, New York, MUrray Hill 7-5884

L.B. Smith AIRCRAFT CORPORATION

International Airport • Miami, Fla.

DeHavilland Dove

S-A Series: Nine (9) passenger airline seating; New interior — new exterior paint; All weather radio — dual flight instruments; Surface and prop de-icing; Low time engines (320-30); All bulletins complied with; Excellent condition; Airplane presently in service in Northeast; Asking $63,000.00.
Flight Magazine P. O. Box 750, Dept. T, Dallas 21, Texas

NON-BREAKABLE
TETRALITE
SPARK PLUG TERMINAL SLEEVES
FOR THREADED OR STANDARD LEADS
J. E. MENAUGH COMPANY
548 WASHINGTON BLVD., CHICAGO 6, ILL.

CAA APPROVED

Immediate Delivery

We stock, overhaul, and install

PRATT & WHITNEY	WRIGHT
R1830	**R1820**
—75, —92, —94	—202, —56, —72
R985	**R1340**

Lycoming — Continental
and our most popular DC-3 engine
Super-92

ENGINE WORKS
Lambert Field **INC.** **St. Louis, Mo.**

$500,000.00 CASH FOR AIRPLANES

We'll spend this each month for clean light twins and single engine or complete dealers stocks new or used.
We pick up — no red tape.

VEST AIRCRAFT CO.

EMpire 6-2663

Box 5306 Denver 17, Colo.

Come Visit Our New Hangar

Pompano Beach, Florida,

Airport by Hillsboro Lighthouse

No Landing Fee **No Traffic**

—furnishing full maintenance, conversion, inspection and overhauls for private business operated DC-3, C47, Lodestar, and D18S, with complete installation and service of radar, radio, autopilots, electronics, etc. 24 hour line service, SHELL 80, 91 and 100 octane gasoline. Extensive recreational facilities on and next to airport—swimming, fishing, golfing, boating, restaurant, showers, etc.

Executive Aircraft for Immediate Delivery—See them at Pompano Beach

Deluxe Super 92 DC-3

New ship guarantee on airframe, 800-hour guarantee on engines. Completely disassembled and rebuilt. Luxurious interior, with all large cabin and picture windows. Lightweight landing gear doors, Collins and Bendix executive radio, many extras. Today's fastest and quietest DC-3, 210 miles per hour.

Aero Commander

Trade in on DC-3. Excellent condition. Your choice of radio complement — Sperry, Collins, etc.

C18 Beechcraft

Trade in on Custom 18. Choice of hydromatic or constant props, choice of excellent Sperry and Collins radio.

Custom 18

New ship guarantee on freshly overhauled airframe, 800-hr. guarantee on engines. Painted exterior, de-icers, radome, large cabin windows, enlarged interior, modified front bulkhead, lavatory, snack bar, special seats. Dual instrumentation, autopilot, Sperry H5 horizon and C2 gyrosyn compass, Collins 51R omni with 51V glide scope, isolation amplifier, dual speakers, many extras.

Grumman Goose

Freshly overhauled airframe, props, and engines (with crankshaft modification), new interior, new exterior paint. Lightweight, late model. Omni, VHF, ADF, etc.

Also To Your Own Order

Super 92 DC-3

Nearing completion as deluxe Super 92 DC-3 to our own specifications, but still early enough in work to incorporate some of your own custom requirements. Will have all large windows, complete disassembly and overhaul, new ship guarantee, 800-hour engine guarantee.

Grumman Gooses

Now in early stages of overhaul, ready for your own specifications. On display in Pompano Beach.

Low Time C47s

A new one each month. They are now in various stages of disassembly, overhaul, and conversion at our four conversion centers in St. Louis, Toledo, McBride, and Pompano, and can be completed with many of your own modifications, with choice of engines, radio and electronic equipment, and airframe refinement. On display in St. Louis, Toledo, and Pompano Beach.

Remmert-Werner

Inc. of **ST. LOUIS** Lambert Field

Inc. of **TOLEDO** Express Airport

Inc. of **FLORIDA** Pompano Beach

...at Aero Corporation, Atlanta, Georgia

They depend on proved Texaco quality for critical helicopter lubrication

Forward looking Aero Corporation has complete facilities for servicing the fast growing helicopter business. Aero uses and recommends *Texaco Aviation Gasoline* and *Texaco Aircraft Engine Oil.*

Lubrication of the whirlybirds is highly critical. That's why the Aero Corporation, known as the South's leading facility for aircraft maintenance and conversion, protects its reputation for quality by using only Texaco products —products known and respected in all 48 States.

Added proof that Texaco uniform high quality is the choice everywhere is the fact that:

During the past 22 years more scheduled revenue airline miles in the United States have been flown with Texaco Aircraft Engine Oil than with all other brands combined.

Let a Texaco Aviation Representative show you how Texaco can help *your* business grow. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, *Aviation Division,* 135 East 42nd Street, New York 17, New York.

TEXACO HELICOPTER LUBRICANTS

Product	Specification
Texaco High Temp Grease	MIL-L-3545
Texaco Aircraft Starter Grease	MIL-L-7187
Texaco Uni-Temp Grease	MIL-G-3278
Texaco Regal Starfak Special	MIL-L-7711
Texaco Hydraulic Oil AA	MIL-H-5606
Texaco Aircraft Engine Oil 1065 and Aircraft Engine Oil 100	MIL-L-6082
Texaco Havoline Motor Oil SAE 10W	MIL-L-2104
Texaco Low Temp Oil	MIL-L-7870

TEXACO

LUBRICANTS AND FUELS FOR THE AVIATION INDUSTRY